JOURNAL OF
The American Geriatrics Society

Volume II *November 1954* Number 11

CONTENTS

Surgical Alleviation of Parkinsonism: Effects of Occlusion of the Anterior Choroidal Artery. *I. S. Cooper* 691
Anticoagulants in Cardiovascular Disease. *G. C. Griffith* 719
Herpes Zoster: Review, With Preliminary Report on New Method for Treatment of Postherpetic Neuralgia. *F. Schiller* 726
A New Boon to the Aged—Relief of Nocturnal Leg Cramps. *W. H. Lane, Jr.* 736
Criteria for the Feasibility of Rehabilitation in the Geriatric Patient. *E. J. Lorenze* 739
Diagnosis and Treatment of Diseases of the Bladder in the Aged. *N. J. Heckel* 746
Thrombophlebitic Edema and Hydrocortisone: A Case History. *F. H. Glazebrook* 753
Abstracts of Current Literature 754
The American Geriatrics Society
Graduate Symposium on Geriatric Medicine—Program 763
The 1955 Annual Meeting 768
Index to advertisers 36

FELLOWSHIP IN THE AMERICAN GERIATRICS SOCIETY AND SUBSCRIPTION TO THE JOURNAL

Fellowship in the American Geriatrics Society is open to all physicians who are members in good standing of their state or provincial medical societies and similar organizations in other countries. Fellowship dues, which include a subscription to the JOURNAL OF THE AMERICAN GERIATRICS SOCIETY, are $15.00 per year. Application blanks may be secured from the Secretary, Dr. Malford W. Thewlis, 25 Mechanic Street, Wakefield, Rhode Island.

For purposes of simplicity, it has been decided that dues of any Fellows received up to September 30 will apply to the year in which they are received and that dues of new Fellows received after that date will apply to the subsequent year.

The JOURNAL OF THE AMERICAN GERIATRICS SOCIETY is the only official publication of the Society.

(In writing to advertisers, please mention the journal—it helps.)

JOURNAL OF

The American Geriatrics Society

Official Journal of the American Geriatrics Society

EDITOR IN CHIEF

EDWARD HENDERSON

Editor
PHEBE K. THOMPSON

Abstract Editor
GLADYS S. KOCH

EDITORIAL BOARD

GEORGE W. AINLAY, SR.
EDWARD B. ALLEN
BROCK E. BRUSH
FREMONT A. CHANDLER
HOLLIS E. CLOW
WARREN H. COLE
ROBERT ELMAN
FRANK GLENN
GEORGE C. GRIFFITH
NORRIS J. HECKEL
WILLIAM F. HUGHES, JR.
LAURANCE W. KINSELL
WILLIAM B. KOUNTZ
HAROLD W. LOVELL
THOMAS H. MCGAVACK
FRANCIS M. POTTENGER, JR.
ROBERT J. PRIEST
CORNELIUS P. RHOADS
LEO T. SAMUELS
HAROLD O. SCHNEIDER
CHARLES T. STONE
RICHARD W. TELINDE
MALFORD W. THEWLIS
MARVIN WEINBERG
MILEY B. WESSON
HAROLD G. WOLFF

Foreign Section

L. BRULL
A. P. THOMPSON

AMERICAN GERIATRICS SOCIETY, Inc.

OFFICERS: *President:* NORRIS J. HECKEL, M.D.; *Vice-President:* EDWARD HENDERSON, M.D.; *Secretary:* MALFORD W. THEWLIS, M.D.; *Treasurer:* RICHARD J. KRAEMER, M.D.
BOARD OF DIRECTORS: *Chairman,* MALFORD W. THEWLIS, M.D.; EDWARD B. ALLEN, M.D.; HOLLIS E. CLOW, M.D.; EDWARD HENDERSON, M.D.; RICHARD J. KRAEMER, M.D.
Address of the Secretary: MALFORD W. THEWLIS, M.D., 25 Mechanic Street, Wakefield, Rhode Island.

Subscriptions. The *Journal* is published monthly; twelve issues (Jan.–Dec.) constitute a volume. Subscriptions are sold on a volume basis, prorated if back volumes are not available. The subscription price is $10.00 per volume inside the Postal Union. Foreign postage is 75 cents extra. Subscriptions for members of the American Geriatrics Society are included in the annual dues which are $15.00. Single copies, when available, are $1.25 per copy. Publisher must be notified 60 days in advance of change of address. Undeliverable journals will be destroyed.

Correspondence relating to remittances for subscriptions, back volumes and advertising should be sent to THE WILLIAMS & WILKINS CO., Mt. Royal & Guilford Aves., Baltimore 2, Md.

All correspondence concerning editorial matters should be sent to: EDWARD HENDERSON, M.D., 236 Midland Ave., Montclair, N. J.

Correspondence relating to remittances for reprints should be sent to the Waverly Press, Inc., Mt. Royal & Guilford Aves., Baltimore 2, Md.

Correspondence concerning membership applications and membership dues should be sent to: MALFORD W. THEWLIS, M.D., *Secretary,* American Geriatrics Society, 25 Mechanic Street, Wakefield, Rhode Island.

No part of any article published in this journal may be duplicated or reproduced without permission of the author, publisher and editor. COPYRIGHT 1954, BY THE AMERICAN GERIATRICS SOCIETY PRINTED IN U.S.A.

THE JOURNAL OF
The American Geriatrics Society
Official Journal of the American Geriatrics Society

VOLUME II *November, 1954* NUMBER 11

SURGICAL ALLEVIATION OF PARKINSONISM: EFFECTS OF OCCLUSION OF THE ANTERIOR CHOROIDAL ARTERY*

IRVING S. COOPER, M.D.

Department of Neurologic Surgery, New York University-Bellevue Medical Center, New York, N. Y.

Surgical intervention in parkinsonism has not been generally considered to offer much hope for solution of the problem (1). Hitherto it has mainly consisted of damaging the corticospinal (pyramidal) system, either at the motor cortex (1, 2) or in the cervical cord (3), and so producing a loss of motor power and some relief of tremor. As late as 1954, Merritt (4) asserted that surgical procedures "appear to have some degree of success only when the corticospinal tracts are injured and a hemiplegia or mild hemiparesis is substituted for the tremor or rigidity."

In 1952 we observed that virtually complete relief of tremor and rigidity followed the accidental occlusion of the contralateral anterior choroidal artery in a man with parkinsonism (Case 1, described subsequently). In 1953 we reported (5, 6) that deliberate occlusion of this artery alleviated resting tremor and rigidity without compromising motor power and without producing the "syndrome of the anterior choroidal artery" (hemianopsia, hemiplegia and hemianesthesia).

We now report the surgical occlusion of the artery 40 times in 34 patients (bilaterally in 6), of whom 6 have been followed for more than one year. Our findings show that the objective signs of far-advanced, disabling parkinsonism can be reversed, without motor loss, by this operation. Rigidity and tremor have not recurred during the year or more that the patients have been followed. Although the number of cases and the duration of the follow-up periods are not yet sufficient for conclusive evaluation, our clinical observations are given here as a progress report. Surgical technique and other matters are presented elsewhere (7).

THE ANTERIOR CHOROIDAL ARTERY

Gross anatomy

The anterior choroidal artery originates from the internal carotid between the posterior communicating and middle cerebral arteries, about 1 to 5 mm. above

* This study was assisted by the Allen P. and Josephine B. Green Foundation.

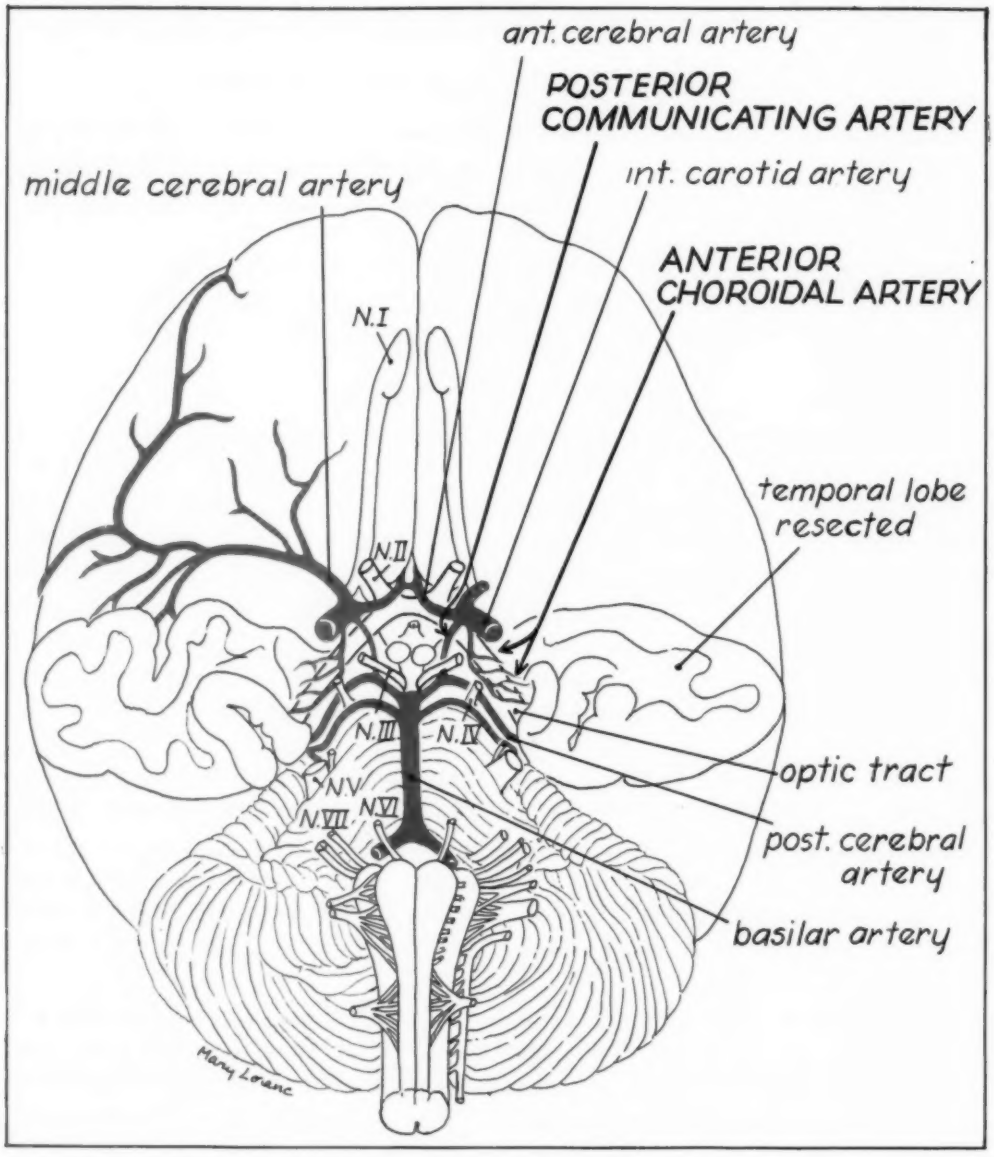


FIG. 1. Base of brain, demonstrating arterial circle of Willis, and origin and course of the anterior choroidal artery. (Reproduced by the courtesy of author and publisher (The Williams & Wilkins Co.), from Alexander (8)).

the former (Fig. 1). It supplies most of the globus pallidus, the corpus subthalamicum and ventrolateral nucleus of the thalamus, and the upper parts of the substantia nigra and red nucleus as well as the ansa lenticularis (Fig. 2). It also sends branches to the hippocampus and optic tract, and to the lateral geniculate body and choroid plexus, making rich anastomoses in these situations with posterior choroidal branches of the posterior cerebral artery. It supplies in part the posterior portion of the internal capsule, which also has other blood

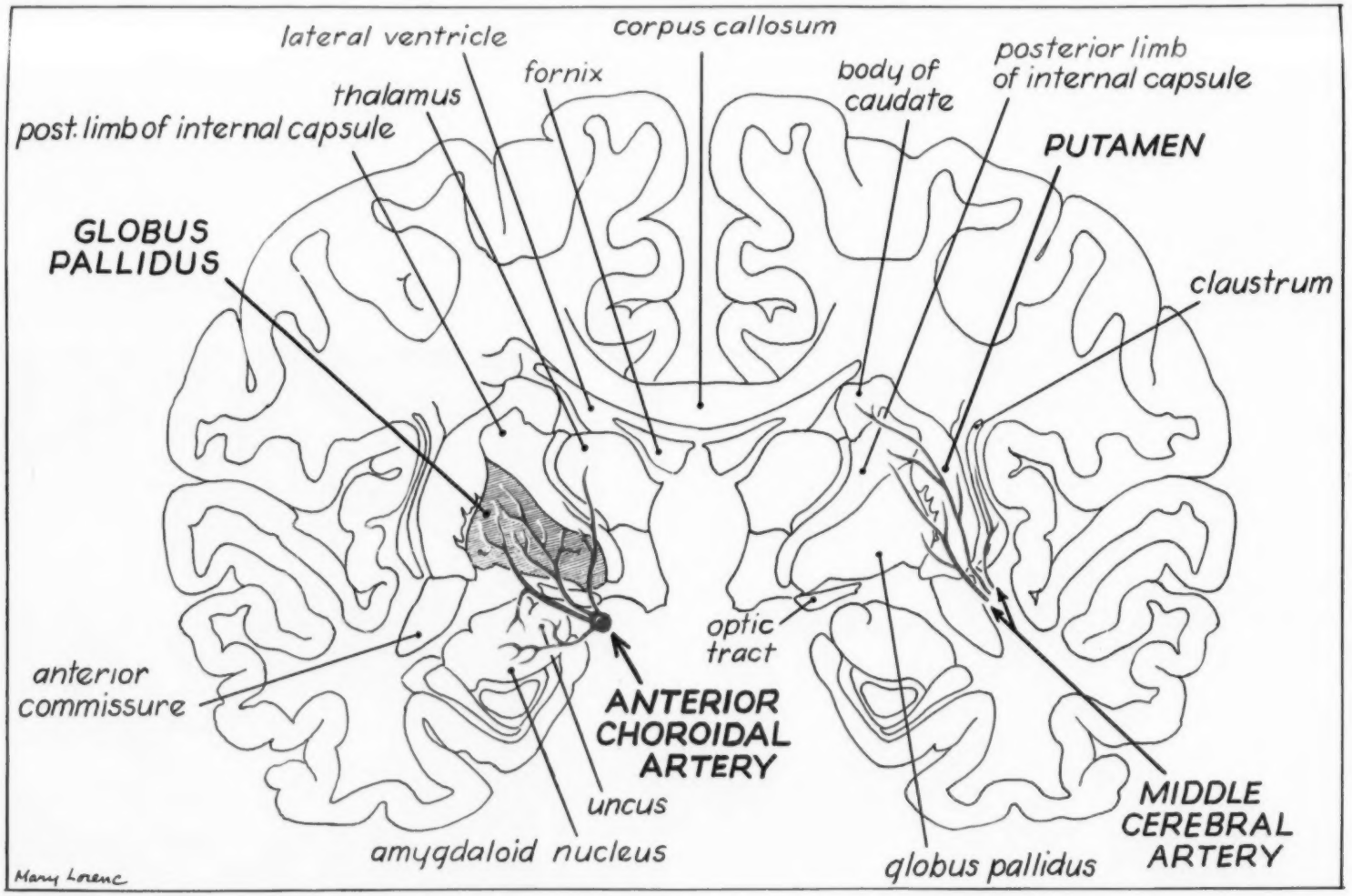


FIG. 2. Cross-section through cerebrum at level of globus pallidus, demonstrating distribution of anterior choroidal artery to mesial globus pallidus. Branches of the middle cerebral artery supply the putamen and lateral globus pallidus. (Reproduced by the courtesy of author and publisher (Cambridge University Press), from Abbie (10)).

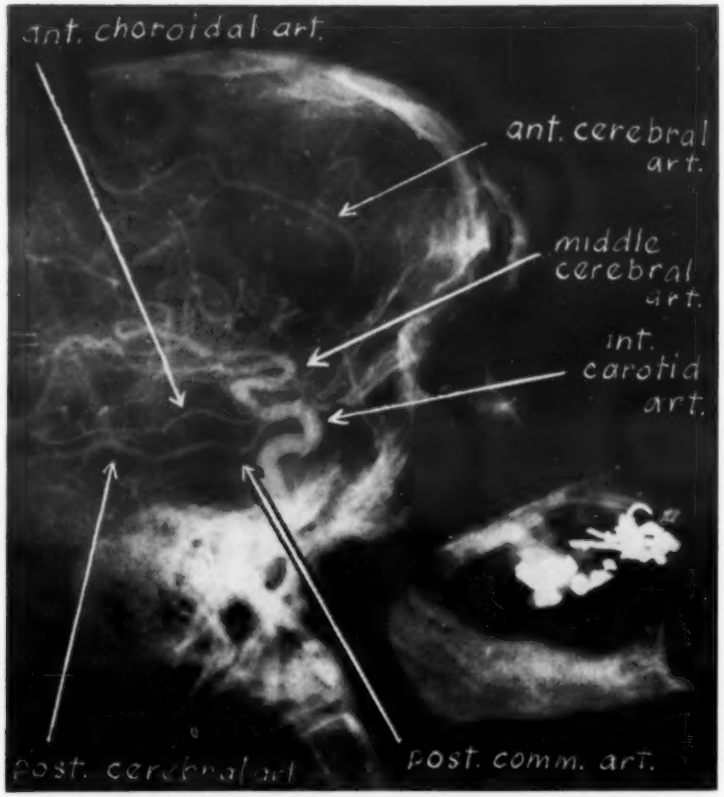


FIG. 3. Cerebral arteriogram made preoperatively in Case 6 to aid in evaluation of origin, course and relations of the anterior choroidal artery.

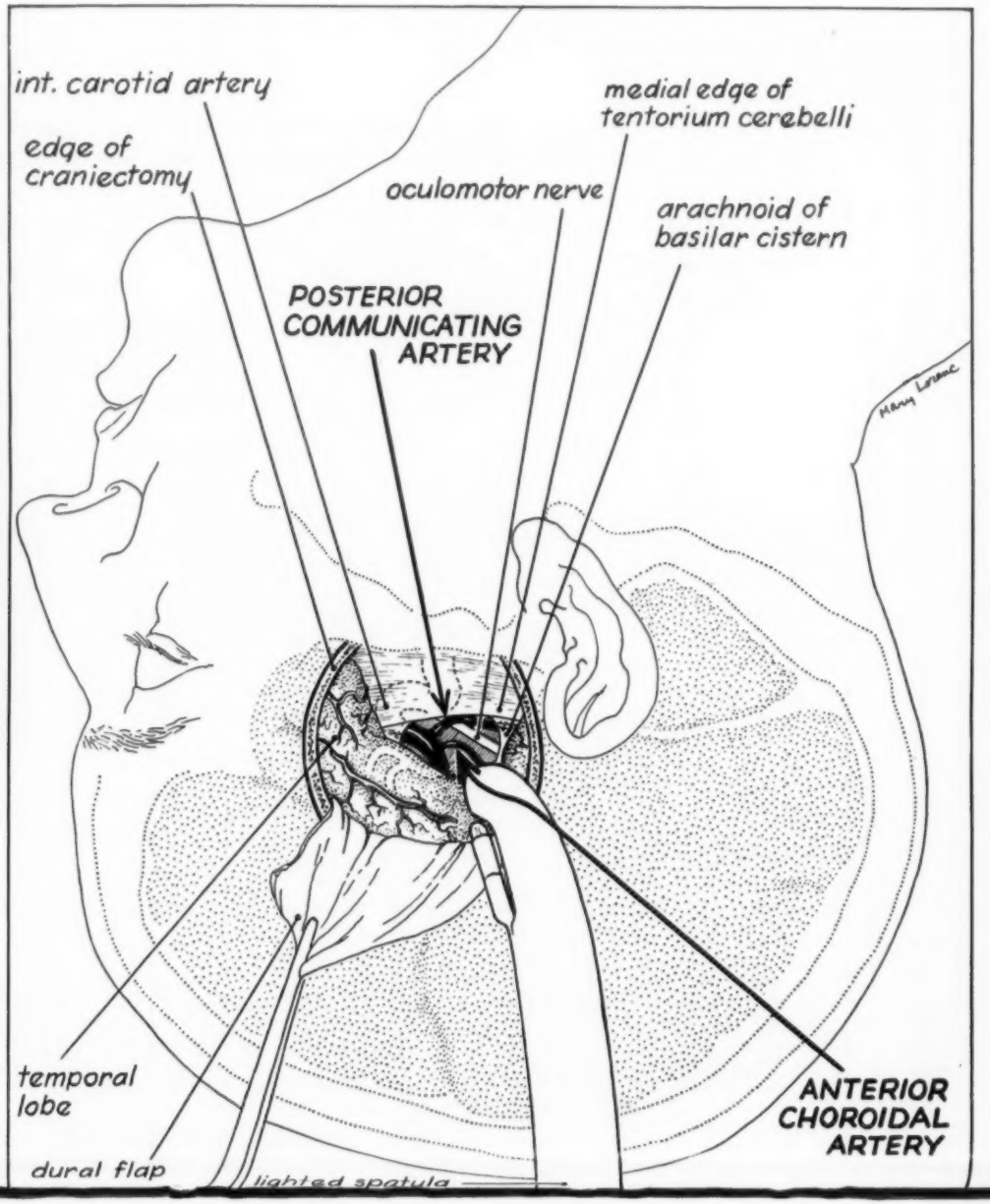


FIG. 4. Diagrammatic representation of surgical approach to, and

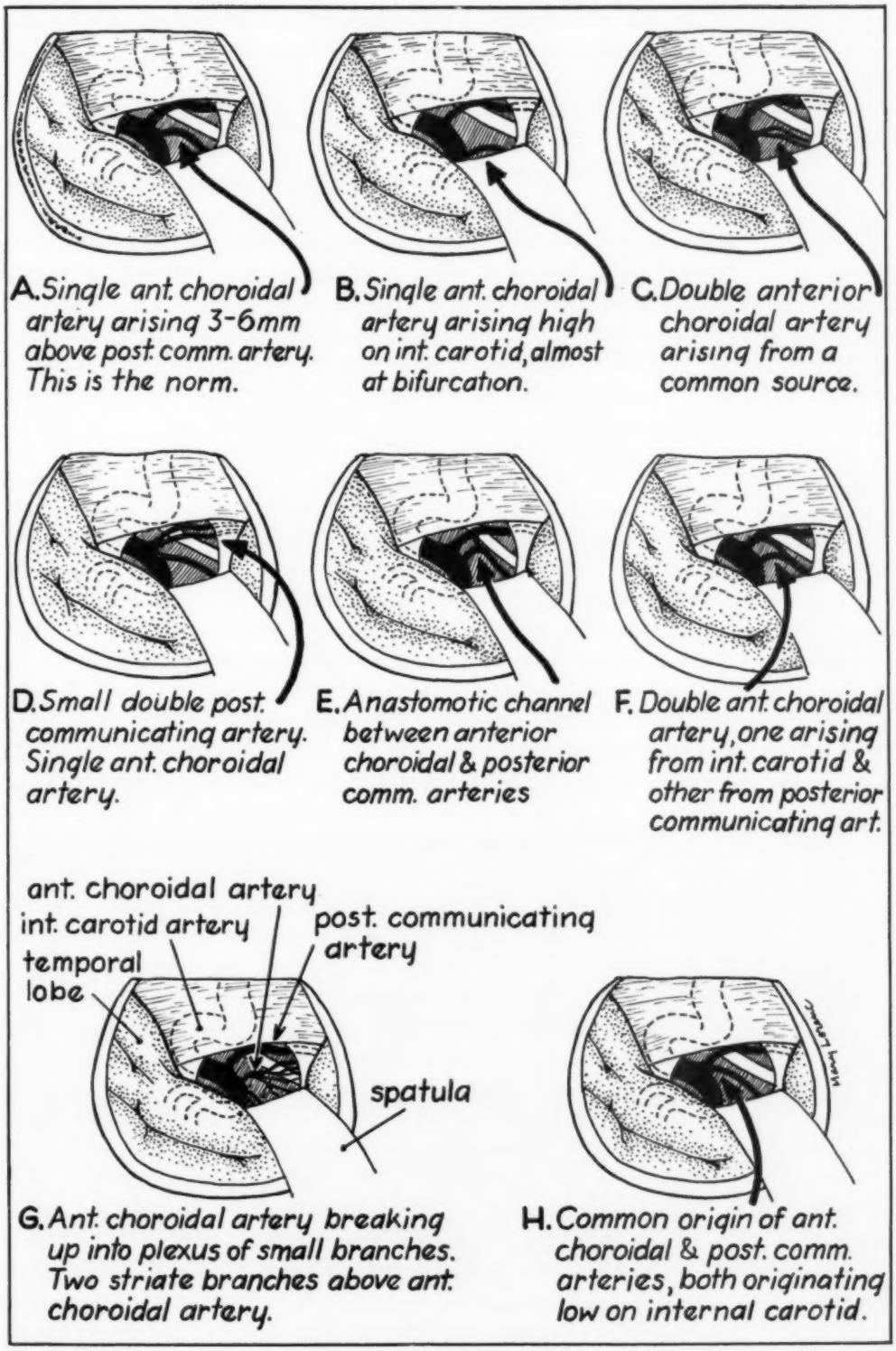

A. Single ant. choroidal artery arising 3-6mm above post. comm. artery. This is the norm.
B. Single ant. choroidal artery arising high on int. carotid, almost at bifurcation.
C. Double anterior choroidal artery arising from a common source.
D. Small double post. communicating artery. Single ant. choroidal artery.
E. Anastomotic channel between anterior choroidal & posterior comm. arteries
F. Double ant. choroidal artery, one arising from int. carotid & other from posterior communicating art.
ant. choroidal artery
int. carotid artery
post. communicating artery
temporal lobe
spatula
G. Ant. choroidal artery breaking up into plexus of small branches. Two striate branches above ant. choroidal artery.
H. Common origin of ant. choroidal & post. comm. arteries, both originating low on internal carotid.

FIG. 5. Variations in origin of the anterior choroidal which have been encountered during this investigation. Artist's reproduction of sketches made at time of surgery.

FIG. 4. Diagrammatic representation of surgical approach to, and

supply; but the medial and intermediate segments of the globus pallidus are supplied by this artery alone, and are most vulnerable to occlusion of the artery (8).

Arteriography

Morello and Cooper (9) have reviewed a number of cerebral arteriograms, including those in 30 of the 34 patients reported here, in whom direct visual confirmation could thus be secured. The anterior choroidal artery was visualized in 92 per cent of the arteriograms. Decisive information as to its site of origin, caliber, course, and relation to the posterior communicating artery was obtained from the arteriograms (Fig. 3) and compared with that obtained by surgical anatomy studies (Fig. 5). Anastomoses may be seen occasionally.

Arteriography is valuable in demonstrating whether or not surgical occlusion has been successful.

Surgical anatomy

We have found it increasingly easy to identify the artery by way of a small subtemporal craniectomy. (A detailed study of the contributions of Abbie (10, 11) and Alexander (8), as well as of Bassett's (12) stereoscopic atlas, will facilitate locating the vessel.) Despite individual variation, the vessel could be positively identified in all of 40 consecutive operations. It was readily identified in 1 instance in which it did not appear in the arteriogram.

The temporal lobe is elevated to expose the arachnoid of the basilar cisterns (Fig. 4); the arachnoid is then opened anterior to the oculomotor nerve. In postencephalitic cases, adhesions of the uncus and arachnoid to the oculomotor nerve are common and must be dissected free to permit elevation of the uncus and afford adequate exposure. The first branch of the internal carotid, after it emerges from the cavernous sinus, is the posterior communicating artery; this may be traced downward over the oculomotor nerve to its juncture with the posterior cerebral artery. The branch next above is the anterior choroidal (Fig. 5).

Method of occlusion. The artery is traced for at least 1.5 cm. It is coagulated close to its origin, and again 0.5 cm. distally, the internal carotid being protected by a moist cotton patty. Complete desiccation is mandatory, and must be painstakingly carried out if it is hoped to obliterate the pallidal blood supply. Not only the origin of the artery, but the 0.5-cm. distal point must be occluded, in order to prevent reflux via the posterior choroidal anastomoses.

We have learned that ligation by means of silver clips alone does not occlude the pallidal blood supply with certainty. In this respect arteriography has been invaluable. In several early cases in our series we found only partial or transient relief of symptoms, and in those cases arteriography showed that the vessel had not been entirely occluded. Subsequent re-operation and coagulation of the artery secured the desired result. Had it not been for postoperative arteriography we might have concluded erroneously that the method is ineffective.

RESULTS OF OCCLUSION

Our most notable finding has been that the tremor, rigidity and other abnormalities which comprise the syndrome of parkinsonism are often abolished by occluding the anterior choroidal artery. Moreover, as the selection of patients, surgical technique and postoperative care have improved, the results have improved accordingly and the hazard of surgery has diminished. Thus our most recent results are even more encouraging than those originally reported. Finally, the benefit has endured for one year or longer without recurrence of the disease. As to specific features:

Tremor

Resting tremor was virtually abolished in the extremities contralateral to the occluded artery in 70 per cent of our cases. In the remainder the tremor, though not abolished, was lessened. Among early cases, as previously noted, only transitory relief of tremor was obtained when occlusion was attempted with silver clips; but when occlusion was actually secured, by coagulation, it was followed by marked relief of symptoms. Motor power was not compromised, as shown by electromyographic studies and successive moving picture films.

Alleviation or disappearance of tremor was evident immediately after operation in the successful cases. Also noted immediately (unless the patient was markedly somnolent after operation) was improved usefulness of the affected hand and arm (Figs. 7, 8 and 9).

Rigidity

Rigidity and the disabilities provoked by it were significantly lessened in every case of successful occlusion. Cogwheel rigidity, resistance to passive movement,

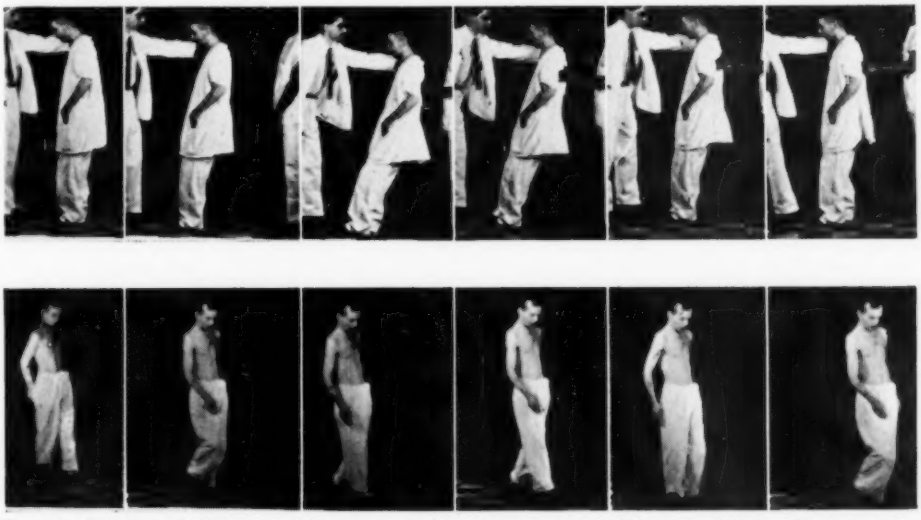


FIG. 6. (Top row) Segment of preoperative cinematographic record from Case 8, demonstrating inability to stand or walk due to retropulsion. (Bottom row) Segment from cinematogram made three weeks after operation. Patient can stand and walk unaided.

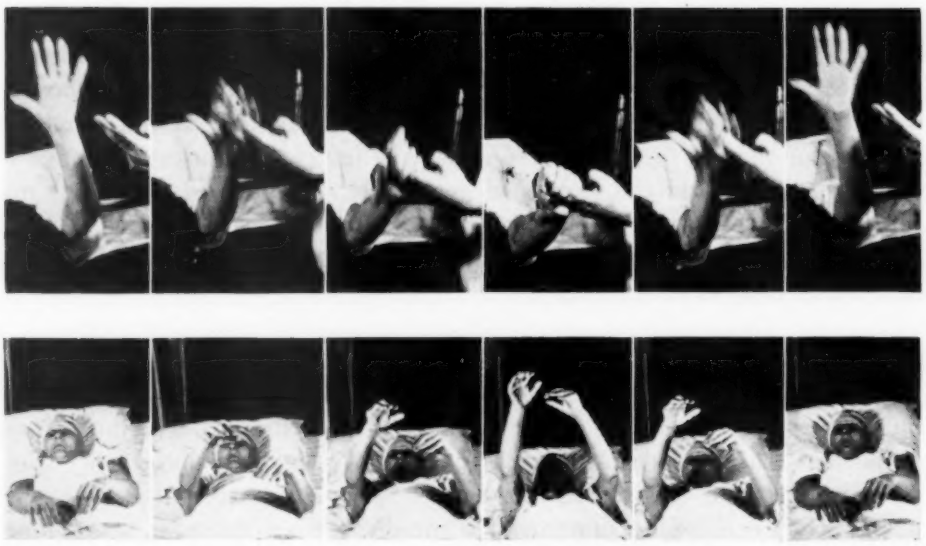


FIG. 7. Segment from cinematogram made twenty-four hours after occlusion of right anterior choroidal artery in a 53-year-old female. Tremor and rigidity were relieved in left extremities. (Top row) Note ability to squeeze fingers of examiner with left hand. (Bottom row) Note ability to raise left arm and lower it. These photographs and Figures 8 and 9 are presented to demonstrate preservation of motor power, in association with the alleviation of tremor and rigidity. It is obvious from these figures that not even a temporary hemiparesis or inability to use the extremities resulted in these cases.

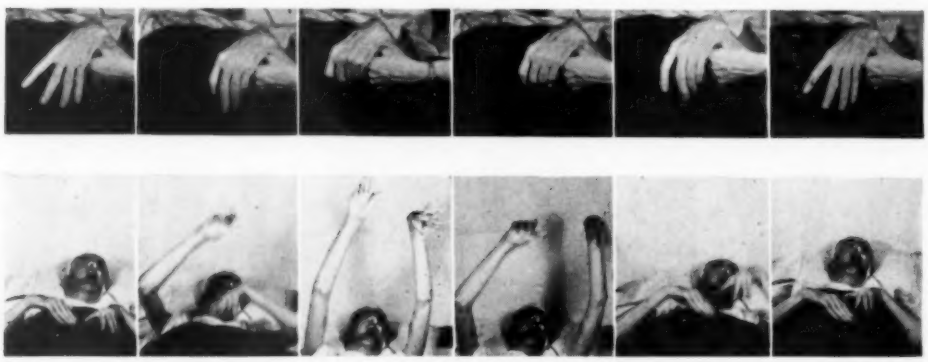


FIG. 8. Segment from cinematogram made twenty-four hours following occlusion of right anterior choroidal artery in Case 5 of this report. (Top row) Ability to grasp fingers of the examiner with left hand, although preoperatively this motor function could not be accomplished because of deformity. (Bottom row) Ability to raise and lower left upper extremity voluntarily. No motor weakness or agnosia of extremities.

and immobility decreased markedly or disappeared. These changes are shown objectively by electromyography.

Gait

Several patients demonstrated an improvement in gait. Many were bedridden

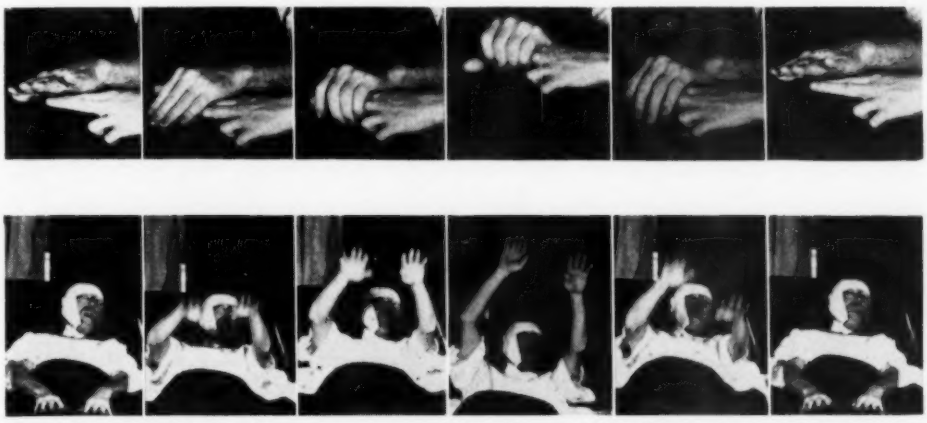


FIG. 9. Segment from cinematogram made two hours following occlusion of right anterior choroidal artery in Case 7 of this report. (Top row) Ability to squeeze fingers of examiner with left hand. (Bottom row) Ability to raise and lower left extremity. No motor weakness or agnosia of extremities.

before operation but are now able to work unaided. Propulsion and retropulsion have, in some patients, disappeared (Fig. 6).

Motor power

Hemiplegia in the contralateral extremities developed after operation in 2 patients. Slight weakness for from ten to fourteen days after operation was seen in 3 others. The remaining 29 patients had no loss of motor power, as shown by moving pictures (Figs. 7, 8, 9).

The relief of tremor and rigidity was in no way dependent upon the sacrifice of motor power. On the contrary, in several cases motor power was actually increased after operation; and in most patients the affected extremities became more useful, as shown in the case histories.

Handwriting

Doubtless a reflection of the relief of tremor and rigidity, remarkable improvement in handwriting was noted in several patients. It afforded striking, objective evidence of the change in functional activity postoperatively (Figs. 13, 16 and 22).

General disability

Like handwriting, all other activities of daily life are often markedly improved compared to the condition in classic parkinsonism, which is characterized by "a severe degree of helplessness" (13, 14). Some patients who were totally helpless in all spheres of activity, and had been so for many years, were able to care for themselves, and some actually returned to gainful employment.

Deformity

Deformities of the hand are a common disabling feature of parkinsonism. Even when the deformity had been of many years' standing and seemed irre-

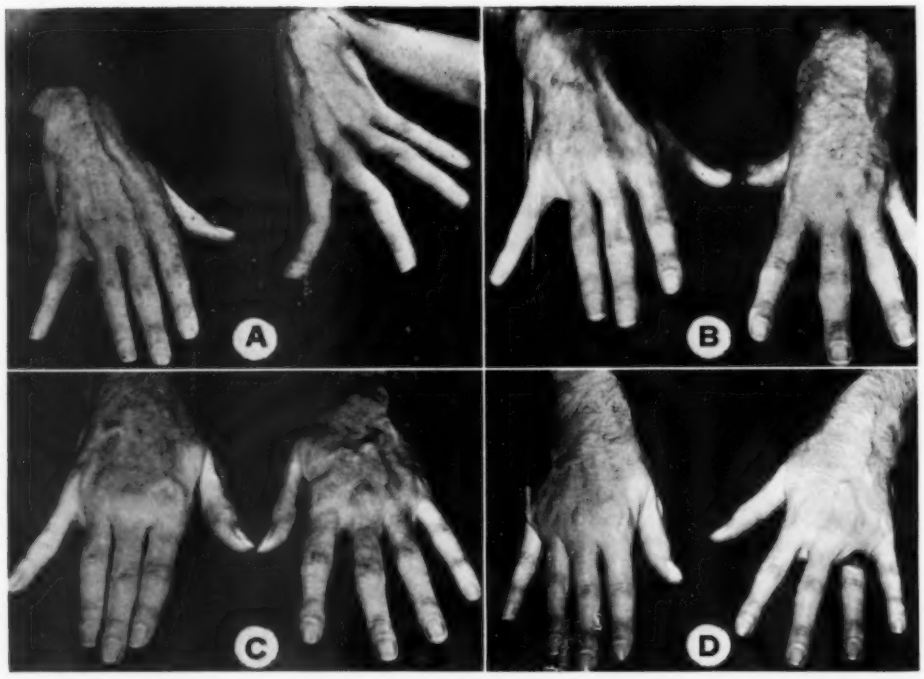


FIG. 10. Reversal of deformity of left hand in Case 5 following occlusion of right anterior choroidal artery. A. Preoperative photograph demonstrating fixed deformity of left hand, with extreme flexion at the wrist and extension at interphalangeal joints. Thumb is fixed in palm in marked adduction. B. Two weeks following operation the hand is no longer rigid and adduction of thumb is no longer present. C. Four months following operation, left hand appears normal. D. Follow-up photograph taken ten months after operation, at which time hand still appears normal.

versible to manipulation under anesthesia, the hand has become normal in appearance following operation (Figs. 10, 11 and 12). It will be appreciated that alleviation of such a deformity as shown in Figure 10A must cast considerable light upon the physiologic disturbance entailed in deforming neurologic disease.

Speech

Several patients showed considerable improvement in ability to speak audibly and intelligibly. Evaluation by the speech therapist, Miss Joyce Feldstein, in 2 patients follows:

"A 46-year-old white male with parkinsonism of 21 years' duration had been almost completely noncommunicative for four years. Preoperatively the patient could make no lateral movements of the tongue and tongue protrusion was limited to ¼ inch beyond the teeth. Because of the tremendous effort necessary to speak, the patient's verbal output was usually monosyllabic. Vocal intensity was weak and barely audible. The duration of phonation did not exceed 3 seconds. Functional motility of the lips was poor. The patient smiled rarely and only with great effort. Postsurgically this patient presented a remarkably different picture. Gross lateral movements of the tongue are now present but still weak. The tongue

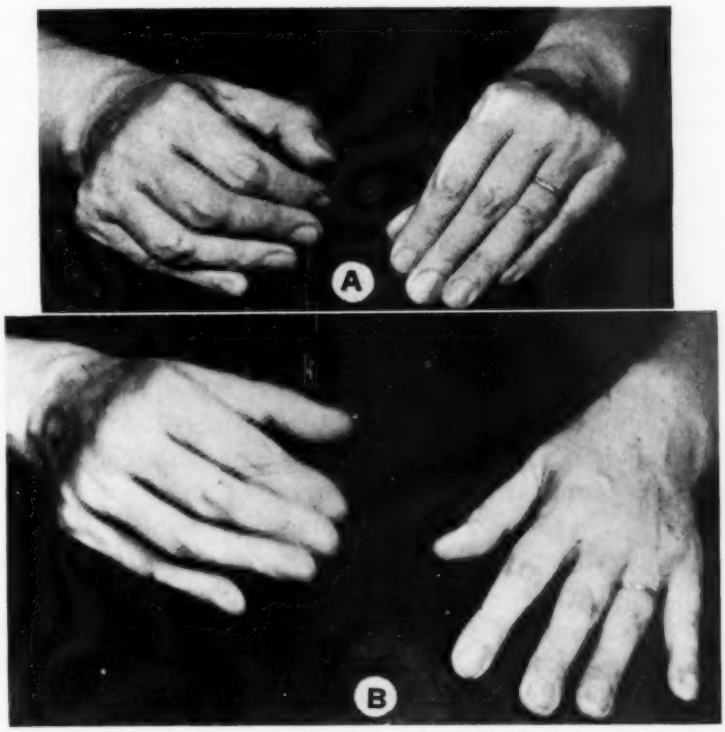


FIG. 11. A. Preoperative photograph of the hands of the 53-year-old woman represented in Figure 7, demonstrating deformity of left hand, typical of that usually seen in parkinsonism. B. Photograph taken six weeks after right anterior choroidal artery occlusion reveals reversal of deformity of left hand.

FIG. 12. A. Preoperative photograph demonstrating deformity of left hand in 48-year-old white male. B. Reversal of deformity of left hand following coagulation of the right anterior choroidal artery.

can be protruded ½ inches beyond the teeth. The patient now communicates in sentences. Vocal intensity is weak but audible and is controllable to some extent. Duration of phonation is 10 seconds. Functional motility of the lips is fair and the patient smiles frequently and spontaneously. Drooling is diminished. The most outstanding feature postoperatively is the return of spontaneity of movement."

"A 40-year-old white male with parkinsonism of 29 years' duration was found, prior to surgery, to have an inaudibly weak voice with intermittent aphonia. The articulatory component of speech was more easily controlled by the patient than was phonation. Postsurgically, there was a dramatic change in voice quality and in the ease of initiation of phonation. The patient now produces deep, husky, vocal quality of fairly adequate vocal intensity and is able to phonate with a minimum of effort."

Electromyography

Electromyographic studies, made before and after operation in the later cases of the present series, confirmed objectively the alleviation of tremor and rigidity.[1] As an example the patient in Case 8 (described subsequently) showed before operation a continuous tremor at a rate of 4 to 6 per second with very low voltage in the arms and right leg, induced by attempts at voluntary motion, and pronounced bursts of action potentials in response to attempts to stretch the biceps passively, *i.e.*, in resistance to stretching. Two months after operation the record had become comparatively normal for the right side (the left artery having been occluded), with higher voltages during voluntary motion, no tremor potentials, and no bursts of activity on passive stretching; tremor was still present on the left.

Needless to say, the clinical improvement with respect to rigidity and tremor is unequivocal in the successful cases, and the chief utility of the electrical recording is that of a permanent record in confirmation of clinical findings.

Electroencephalography

Except for tremor artifact, present in the preoperative record of several patients and absent following surgery, there is no characteristic abnormality in parkinsonism. There is, however, a characteristic finding associated with occlusion of the anterior choroidal artery, namely: the appearance of slow (2–6 per second) waves over the frontal, temporal and parietal areas on the occluded side, apparent (for example) three weeks after operation and becoming less marked after a year, though still present. In 2 cases spiking activity was observed in the contralateral frontal areas.

CONTROL EXPERIMENTS

A number of mishaps have provided opportunities for what might be termed control experiments, inadvertently lending considerable weight to the present concept of the effect of occluding the anterior choroidal artery. The use of silver clips, which in 4 early cases failed to produce occlusion, afforded such a control experiment. In these 4 patients the effect of operation was not discernible, or was transitory. Arteriographic study showed that occlusion had not been achieved. Then, when re-operation was performed in 3 of the patients, and the artery obliterated by coagulation, tremor and rigidity were abolished. Cases 2 and 5, in which this occurred, have been previously reported (7) in greater detail and with

[1] The studies were kindly carried out by Dr. Joseph Moldaver.

the respective arteriograms. Hoen (15) and MacLean (16) have had identical experiences.

In 1 patient the artery had been exposed, but at this juncture unexplained hypertension and bradycardia developed and the surgical procedure was terminated. Following operation, the consultants in psychiatry, rehabilitation, and speech therapy examined the patient without being informed about the real state of affairs, and each examiner declared that the patient had not been improved but seemed actually somewhat more disabled. The patient, too, felt worse after operation and expressed considerable disappointment, even before learning that the full surgical procedure had not actually been carried out. This also, provided an excellent control experiment.

COMPLICATIONS

The operative mortality in this series was 10 per cent. In 2 patients, 1 of whom died, there was postoperative hemiplegia. Several patients were somnolent and febrile after operation. We found that prolonged somnolence and morbidity were more likely to occur in patients who were extremely debilitated, lethargic, perspiring, and drooling severely before operation. In these patients postoperative pneumonia was a problem and tracheotomy was necessary in a few instances. In 4 cases ipsilateral oculomotor paralysis developed after operation, clearing spontaneously within six weeks in all instances.

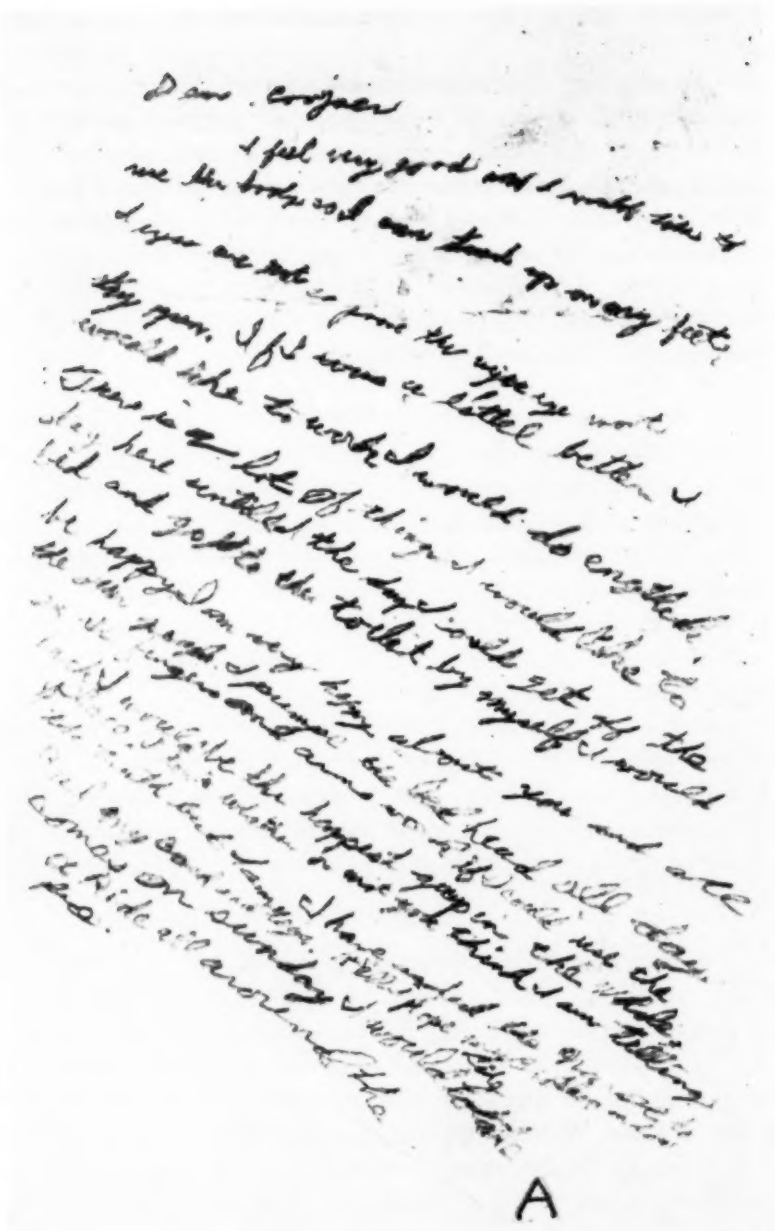
Motor weakness in the immediate postoperative period was found chiefly among patients who, before operation, held their extremities in a hemiparetic attitude and showed a hemiparetic gait, rather than the classic shuffling movement of parkinsonism. From our experience thus far, we are inclined to be cautious about advising the operation in such patients.

PROGNOSIS

We are not now in a position to predict whether any or all of the patients who improved will eventually suffer a return of rigidity, tremor and deformity. Although the present experience is impressive, to other observers as well as our selves, and it is reasonable to anticipate that the results will be regularly duplicated, this too cannot be predicted with certainty. These questions naturally await the test of time. We do, however, feel justified in the general statement that surgical occlusion of the anterior choroidal artery may successfully relieve tremor and rigidity of advanced parkinsonism without sacrifice of motor power.

CASE REPORTS

Ranging from the first to the most recent in our experience, 8 illustrative cases are reported in some detail, though with a view to reasonable brevity. Some have been fully reported previously. The more recent cases are instructive in that they show that the results are reproducible, and also in that the improved criteria for the selection of patients for surgery, and the improved technique, have brought about more complete relief of tremor in these later cases than in those first reported.



A

FIG. 13. Successive letters written by patient reported in Case 2. This patient could not hold a pen to write preoperatively. A. Part of letter written five days following occlusion of right anterior choroidal artery. Left anterior choroidal artery had been occluded six weeks earlier. Note that patient expresses ambition to stand on his feet and to go to toilet unaided. B. Part of letter written by same patient ten months later, demonstrating ability to print. C. Handwritten portion of same letter.

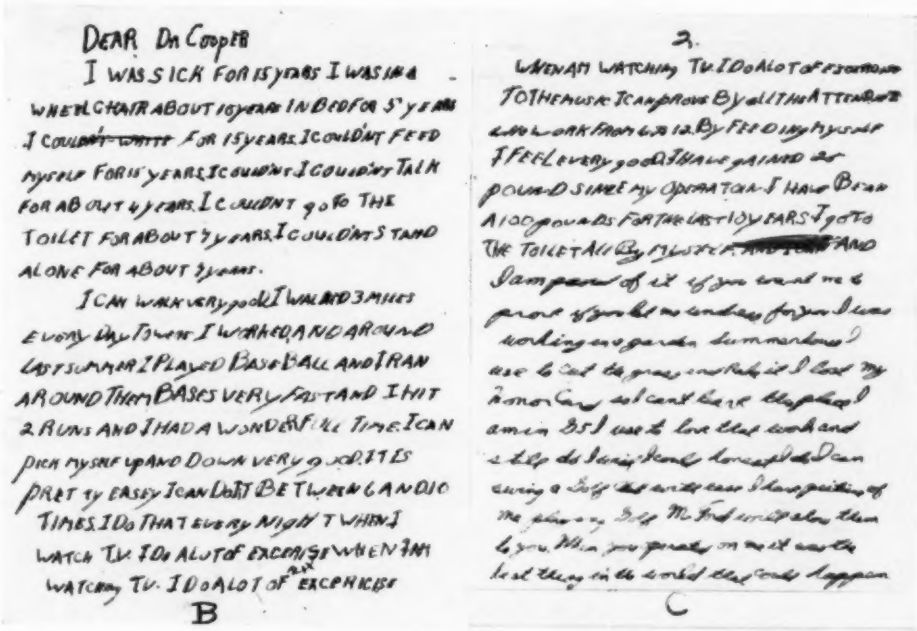

DEAR Dr Cooper
I WAS SICK FOR 15 YEARS I WAS IN A
WHEEL CHAIR ABOUT 10 YEARS IN BED FOR 5 YEARS
I COULDN'T WRITE FOR 15 YEARS I COULDN'T FEED
MYSELF FOR 15 YEARS I COULDN'T I COULDN'T TALK
FOR ABOUT 4 YEARS I COULDN'T GO TO THE
TOILET FOR ABOUT 7 YEARS I COULDN'T STAND
ALONE FOR ABOUT 2 YEARS.
I CAN WALK VERY GOOD I WALKED 3 MILES
EVERY DAY TOWN I WORKED AND AROUND
LAST SUMMER I PLAYED BASEBALL AND I RAN
AROUND THEM BASES VERY FAST AND I HIT
2 RUNS AND I HAD A WONDERFUL TIME I CAN
PICK MYSELF UP AND DOWN VERY GOOD IT'S
PRETTY EASEY I CAN'T BE TWEEN 6 AND 10
TIMES I DO THAT EVERY NIGHT WHEN I
WATCH TV I DO ALOT OF EXCERSISE WHEN I AM
WATCHING TV. I DO A LOT OF EXCERCISES
B
2.
WHEN AM WATCHING TV I DO A LOT OF EXCERCISES
TO THE MUSIC I CAN PROVE BY ALL THAT I HAVE
LOST WORK FROM 6 A 12 BY FEED MYSELF
I FEEL EVERY GOOD I HAVE GAINED 20
POUNDS SINCE MY OPERATION I HAVE BEEN
A 100 POUNDS FOR THE LAST 10 YEARS I GO TO
THE TOILET ALL BY MYSELF AND [redacted] AND
I am proud of it if you want me to
prove it I will be under for you I was
working in a garden last summer and
use to cut the grass in Park it I lost my
[illegible] can't [illegible]
am in 35 I use to love that work and
[illegible]
C

FIG. 13

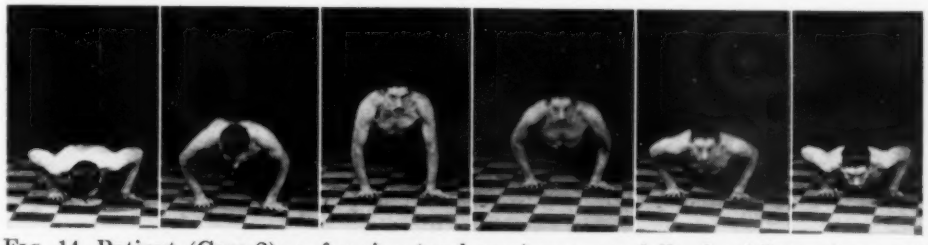


FIG. 14. Patient (Case 2) performing 'push-ups' one year following bilateral operation. Segment from cinematographic record.

Case 1. J. C., a 39-year-old white man, noted onset of tremor and rigidity in the right extremities nine years prior to admission. This had become progressively more severe, causing him to cease working eighteen months prior to admission. There had also been a severe retrocollis for one year. On October 9, 1952, during an operation originally intended as a pedunculotomy, the left anterior choroidal artery was torn and had to be occluded. The operation was terminated at that point.

Since operation, the patient has been free of rigidity in the right arm and leg. He has also been virtually free of tremor on the right side, except for slight degree noted by the examiner on occasions of excitement or emotional duress. The patient uses the right hand for all purposes and is able to write, feed himself, and perform delicate, rapid motions with this hand; he refers to the hand as being "perfect." The severe dystonic retraction of the head and neck, however, has persisted.

Case 2. W. T. was a 36-year-old white man. Bilateral rigidity and tremor of postencephalitic parkinsonism had developed at the age of 18. In 1949, after expressing suicidal ideas, he was admitted to Central Islip State Hospital. By that time he was completely disabled and required constant nursing care. His hospital course was summarized by Dr. F. J. O'Neil as follows: "He was unable to walk alone and required the support of two attendants. There was marked rigidity and tremor of all four extremities, which caused him

to be confined to bed or to a wheelchair. He showed a very marked masked facies and constantly drooled saliva. During his hospitalization, he required constant nursing care, due to difficulty in feeding himself and managing his other daily needs. No response to drug therapy had been obtained."

The left anterior choroidal artery was occluded by silver clips in February 1953. This was followed by marked alleviation of rigidity and tremor of the right extremities. The patient was profoundly somnolent for fourteen days after this procedure. Occlusion of the right artery in March 1953 was followed by similar, but less marked, improvement of the left extremities. During the ensuing year, he demonstrated progressive improvement in all spheres of activity (*e.g.*, letter writing, Fig. 13). He became completely independent in all activities of daily living and is now, eighteen months after the first operation, living alone in a hotel. The most notable aspect has been the relief of complete disability in a previously institutionalized, bedridden, helpless person. This patient has actually been able to take part in recreational athletics, including calisthenics and push-ups (Fig. 14). It should be noted, however, that he never enjoyed complete alleviation of tremor and rigidity, as did several other patients (*e.g.*, Case 3) in whom the artery was coagulated as well as ligated. During excitement, he shows some tremor and rigidity of the left extremities, although he is well enough to live alone and work part time as a plumber's assistant. The technical result, including completeness of arterial obliteration, is inferior in some respects to that in later cases.

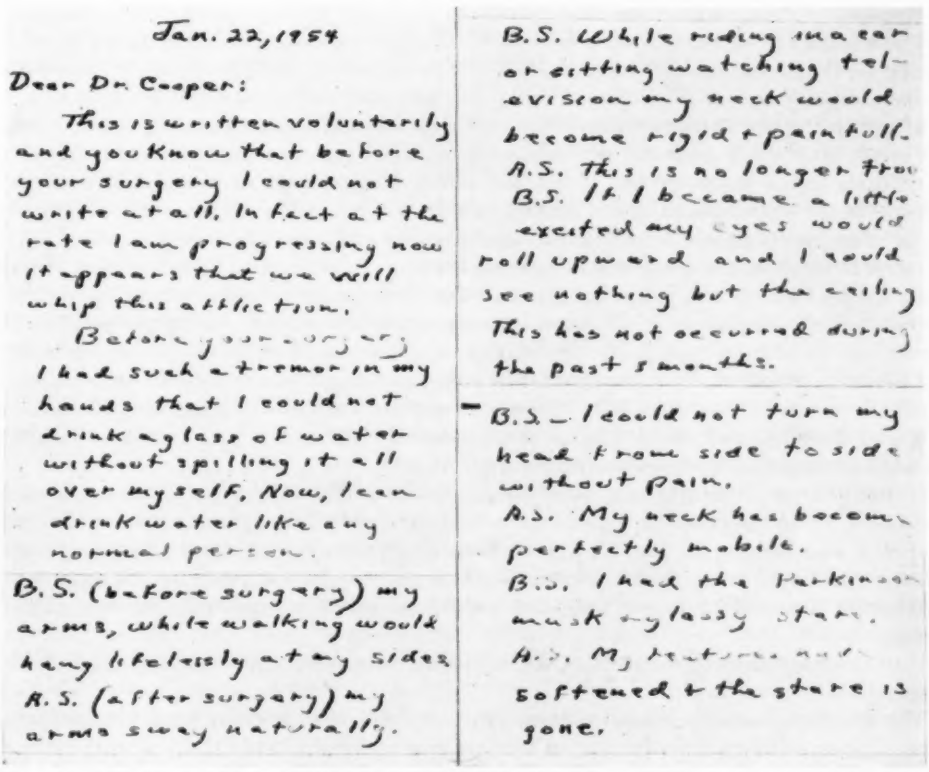
Case 3. A. T., a 59-year-old white man, noted onset of bilateral tremor and rigidity of postencephalitic parkinsonism twenty-five years prior to admission, and became incapacitated seventeen years before admission. By 1946 he was bedridden, with incapacitating tremor and rigidity of all extremities. Examination in June 1953 revealed masked facies, drooling, weak monotonous speech, stooped posture, immobility due to rigidity, inability to rise from a chair, and marked cogwheel rigidity and tremor of all extremities. *The right anterior choroidal artery was occluded July 2, 1953. Since that time the left extremities have been completely free of tremor and rigidity. Motor power in these extremities now exceeds that on the right* (dynametric readings: right 70, left 180). Automatic swinging movements of the

FIG. 15. Photographs of patient reported in Case 3. A. Marked masking of facies noted preoperatively. B. Lessened masking of facies is apparent in this photograph, one year following occlusion of right anterior choroidal artery.

left upper extremities have returned. The patient can rise from a chair, and walk normally, and is completely independent in self-care. Masking of the facies is lessened. He played softball with his neighbors one year after operation. He now cooks and does all of the housework, as his wife is employed. In the eighth and twelfth postoperative months, the patient was examined by Doctors A. Akelaitis and M. Bender and the left extremities were found to be normal. Incapacitation (seventeen years) and tremor and rigidity (twenty-five years) in the left extremities have been absent since operation (Fig. 15).

Case 4. W. M., a 51-year-old white man noted onset of tremor in the right arm in 1941. By 1946 he was moderately disabled by rigidity and tremor of all four extremities, head, and neck, and in 1948 noted onset of oculogyric crises which occurred from three to six times each month. The facies became mask-like, and a shuffling gait developed. By spring of 1953, these symptoms led to his discharge from his position as a sales manager. In July 1953 the right anterior choroidal artery was surgically occluded. Since operation he has been virtually free of tremor and rigidity of the left extremities, and, unexpectedly, has noted gradual reduction of these symptoms on the right as well. He had one oculogyric crisis in the third postoperative month, but none afterward. The other improvements in gait, facies, automatic movements and subjective sensations are noted in a letter from him during the sixth postoperative month (Fig. 16). He has returned to his original employment and is entirely self-sufficient one year after operation.

Case 5. W. D., a 41-year-old white man, had severe encephalitis at the age of 15 and by the time he was 17 was incapacitated by the tremor and rigidity of parkinsonism. Examination in August 1953 revealed an emaciated, completely incapacitated white male. Severe retropulsion prevented him from standing alone. He could not walk without assistance, nor sit unsupported. He could swallow only soft mashed foods, and had to be fed lying down.



Jan. 22, 1954

Dear Dr. Cooper:

This is written voluntarily and you know that before your surgery I could not write at all. In fact at the rate I am progressing now it appears that we will whip this affliction.

Before your surgery I had such a tremor in my hands that I could not drink a glass of water without spilling it all over myself. Now, I can drink water like any normal person.

B. S. (before surgery) my arms, while walking would hang lifelessly at my sides. A. S. (after surgery) my arms sway naturally.

B. S. While riding in a car or sitting watching television my neck would become rigid + painfull. A. S. This is no longer true. B. S. If I became a little excited my eyes would roll upward and I could see nothing but the ceiling. This has not occurred during the past 5 months.

B. S. — I could not turn my head from side to side without pain. A. S. My neck has become perfectly mobile. B. S. I had the Parkinson mask or glassy stare. A. S. My features are softened + the stare is gone.

FIG. 16. Specimen of handwriting of patient cited in Case 4. The content of this letter, written six months following operation, is self-explanatory.

FIG. 17. A. Photograph of patient cited in Case 5 prior to operation. Note debilitated appearance, masked facies, and deformity of left hand. B. Same patient ten months after occlusion of right anterior choroidal artery, demonstrating improvement in facial expression, gain in weight, and change in appearance of left hand.

The face was masked (Fig. 17A) and speech was inaudible. Tremor was severe in all extremities, worse on the left, and rigidity was marked. There was a far-advanced, inflexible deformity of the left hand, with flexion at the wrist and extension of the fingers (Fig. 17A). He could not dress himself, feed himself, bathe, or in any other way care for himself. *Since coagulation of the right anterior choroidal artery in September 1953, he has been free of tremor and rigidity of the left extremities.* The deformity of the left hand has completely disappeared and this hand now appears normal (Fig. 17B). The patient can now speak audibly, swallow regular foods, feed himself, dress himself (Fig. 18), walk well, and rise from a lying or sitting position rapidly and unaided. After twenty-five years of total incapacitation, he is now self-sufficient in the activities of daily living, although not yet able to earn his own livelihood.

Case 6. M. P., a 53-year-old white housewife, had first noted tremor and rigidity of the extremities seven years earlier. These symptoms had progressed rapidly. There was no known history of encephalitis. She had consulted many neurologists, all of whom concurred in the diagnosis of advanced, idiopathic parkinsonism. The initial examination in July 1953 revealed a fairly typical, severe, parkinsonian tremor of all extremities and the head. Rigidity was only moderately severe but involved all four extremities as well as the neck and back. Medication afforded no relief. It was decided to study this patient further before considering the advisability of operation. She was re-examined in March 1954, by which time she had become completely incapacitated. She could no longer feed herself or provide for her own daily needs in her home. The bilateral tremor was much more marked. The gait was slow and shuffling and she fell frequently. General debilitation was marked. Disability, tremor and rigidity were more marked on the left side.

Craniotomy with obliteration of the right anterior choroidal artery was performed in April 1954. From the time the patient recovered from anesthesia, there has been alleviation of tremor and rigidity in the left extremities. Except for intermittent mental confusion, hallucinations and forgetfulness during the first two weeks, the postoperative course was uneventful. These disturbances subsided and the patient was discharged three weeks after surgery.

During the ensuing three months, the following reports were received from the patient's husband and her local physicians:

The husband wrote, in several successive letters: "Mrs. P. is doing very nicely since she returned home. There is no tremor on her left side and I think the right side is improved. She walks alone and steps right out and without any shuffle.Her appetite is good. Since the first week home, she has been doing housework and cooking for the first time in years."

FIG. 18. Section from cinematographic record of Case 5, ten months following operation. This patient was helpless preoperatively. (Top and middle rows) Ability to remove and put on coat unaided. (Bottom row) Ability to tie shoelaces. The preoperative left-hand deformity demonstrated in Figures 10A and 17A refer to the same patient.

Dr. J. DeWitt Kerr wrote: "This lady appears to have been entirely relieved of tremors on the left side and there is appreciable improvement on the right side. She eats better, is gaining weight, and her morale is excellent."

Dr. E. L. Jones wrote: "The patient already prefers to use the left hand more than the right. I am as impressed with the subjective improvement as with the suppression of tremor. The patient states that the constant inner sensation of tightness and quivering is gone."

When the patient was examined three months postoperatively, she was found to have gained 12 pounds and to be much less tense and anxious. Her left extremities were free of tremor and rigidity, and the head shook less. She smiled frequently and the mask-like facies was much less marked. She walked normally, with a contralateral swing on the left. The patient stated, "I can walk up and down steps without difficulty, and for the first time in years, can walk down my porch steps without fear of falling. I have already started to go to the grocery store alone to shop, and have planted strawberries in our garden. I use the typewriter, play the piano, and cook meals. I have been out to dinner several times, which I had given up because I used to spill everything."

The improvement has been maintained to date.

Case 7. L. D., a 48-year-old white man, had noted onset of tremors and rigidity of the left extremities seven years earlier. These symptoms were progressive, so that four years before admission he had been obliged to give up his work as a tinsmith and had remained unemployed. However, the symptoms had remained almost totally confined to the left extremities, so that the patient could walk unaided, feed himself, and attend to his daily bodily needs. Examination revealed a left hemi-parkinsonism with marked constant gross tremor of both left extremities. There was cogwheel rigidity of the left extremities but it was less marked than the tremor. The left leg dragged somewhat in walking and there was no contralateral swing in the left arm. Motor power was good in all extremities. There was early

FIG. 19. Incision which is currently employed for subtemporal approach to the anterior choroidal artery. This photograph was made on fourth postoperative day. The patient pictured is referred to in Case 7.

masking of the facies as well as a minimal and barely detectable rigidity of the right extremities.

Although it had been our early impression that rigidity is affected more than tremor by occlusion of the anterior choroidal artery, we later observed that tremor can also be abolished if the vessel is fully obliterated. This patient was therefore considered for surgery. Since the operation was performed under local anesthesia, certain observations were made which seem worthwhile.

Under local anesthesia, an incision was made in the right temporal area and carried down to the zygoma (Fig. 19). An 0.2 per cent solution of sodium pentothal was administered slowly by continuous intravenous infusion, so as to render the patient drowsy and less anxious, but still responsive. He was maintained at a level of consciousness which enabled him to respond to such commands as "squeeze the anesthetist's hand." The tremor of the left arm and leg was subdued by the drug, but recurred if painful stimulation was applied or if he moved these extremities.

It was noted that there was no evidence of arachnoiditis or arachnoidal adhesions, such as had been noted in most of the previous cases. The anterior choroidal artery was rather unusual, in that soon after its origin it branched into a plexus of tiny vessels, about 6 in number (Fig. 5). Immediately above it were 2 additional small branches which were taken to be striate branches, as described by Alexander. At this point, the pentothal drip was stopped and the response of the patient was tested. He responded rationally to questions and moved all four extremities on command. When he did so, tremor appeared in the left extremities.

The anterior choroidal artery was grasped with bayonet forceps and coagulated. It was

then grasped again with the forceps at a site 0.4 cm. more distal. The base of the plexus was also included in the forceps. Coagulation was repeated and the vessel became white and shriveled, obviously well coagulated—an important technical point.

Within thirty seconds the patient became somnolent and for several minutes did not respond. However, there was no change in vital signs. Then he again became responsive, although drowsily. He would move either the right or left arm, although he needed considerable coaxing to move the left. By the end of the operation, about twenty minutes following occlusion, the patient could respond verbally and move all extremities well. Tremor and rigidity were absent from the left extremities. On his return to the ward, this note was made in the nurse's sheet, "Patient returned from the operating room alert and in good condition. He is talking rationally and squeezes strongly with left hand. The tremor is absent."

Cinematographic records were made of this patient preoperatively, two hours postoperatively (Fig. 9), twenty-four hours postoperatively, and several times thereafter.

There has been no tremor or rigidity in the left extremities since operation. Motor power and sensation in these extremities remained undiminished. He was up and about on the third postoperative day, and could walk up and down stairs unaided one week after operation. During the second postoperative week, there seemed to be, on gross testing, a left homonymous visual defect. However, perimetric examination at one month revealed normal visual fields (Fig. 20). By the third week, he drove his car; at one month, he returned to his trade as a tinsmith. Upon examination at two months, there was no tremor or rigidity, and there was excellent motor power in the left extremities.

Case 8. J. R., a 46-year-old white man, had tremor and rigidity of all four extremities for twenty-one years prior to admission. Progression of the disease was relentless and by 1947 he was completely disabled, and a helpless, constant nursing problem. He was cared for at home by his mother. In February 1949, he was found to have grimacing movements of the face, marked tremor of all extremities, the face and tongue, as well as lead-pipe rigidity of all extremities. The patient was drooling and incapacitated. By the time of admission he had deteriorated still further, and an oculogyric crisis occurred at least twice weekly. He was bedridden and completely helpless, and lay with his mouth open. Medication afforded no relief.

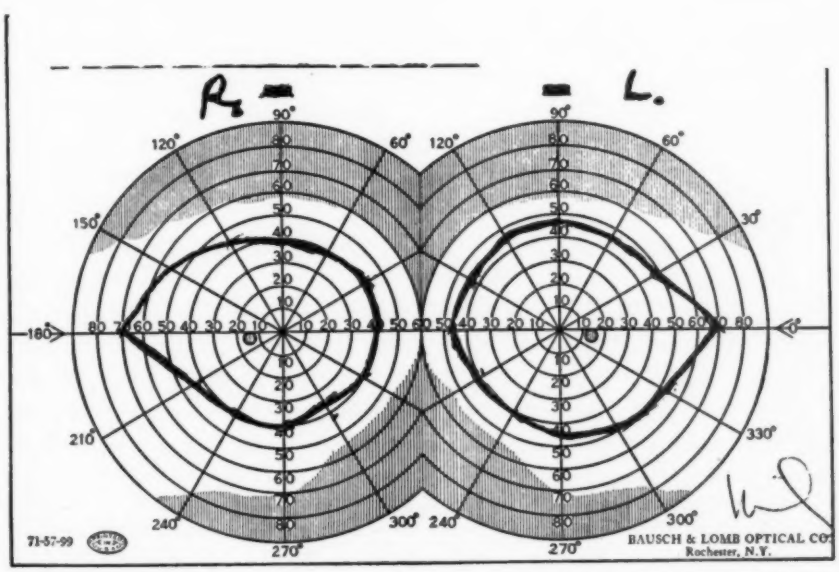


FIG. 20. Visual fields in Case 7, one month following occlusion of right anterior choroidal artery. No hemianopic defect is apparent.

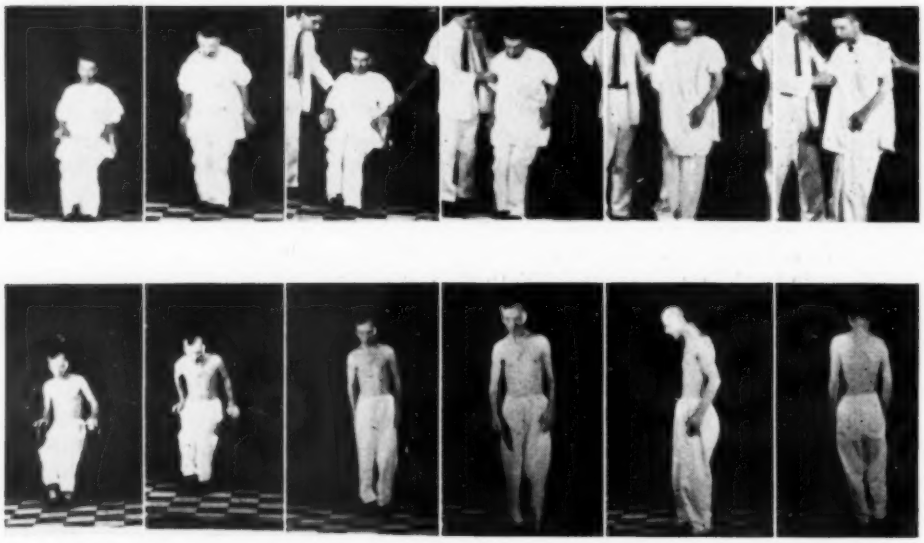


FIG. 21. Segments from preoperative and postoperative cinematographic record in Case 8. A. Inability of patient to rise from chair, and necessity for two attendants to help him to do so. B. Ability of same patient to rise from chair, stand, walk and turn without assistance, three weeks following occlusion of left anterior choroidal artery.

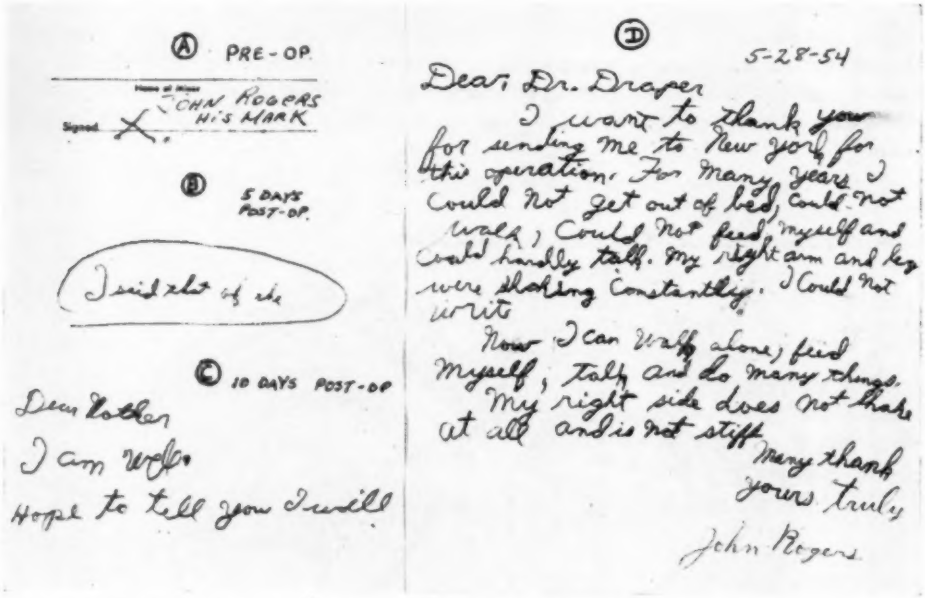

A PRE-OP
JOHN ROGERS
HIS MARK
B 5 DAYS POST-OP.
C 10 DAYS POST-OP
Dear Father
I am well.
Hope to tell you I will
D
5-28-54
Dear Dr. Draper
I want to thank you for sending me to New York for this operation. For many years I could not get out of bed, could not walk, could not feed myself and could hardly talk. My right arm and leg were shaking constantly. I could not write
Now I can walk alone, feed myself, talk and do many things. My right side does not shake at all and is not stiff
Many thank
Yours truly
John Rogers

FIG. 22. Demonstration of improvement in handwriting following occlusion of left anterior choroidal artery. A. The patient barely managed to scrawl a shaky "X" to represent his signature preoperatively. B. Specimen of handwriting of same patient five days after operation. C. Handwriting specimen ten days after operation. D. Letter written three weeks after operation, reproduced by kind permission of Dr. Warren Draper, director of medical welfare fund of the United Mine Workers.

Examination on admission confirmed the earlier findings: the patient had tremor and rigidity of all extremities, more marked on the right; his speech was inaudible; he was drooling, bedridden and completely helpless. When placed in a chair he could not rise from it (Fig. 21A).

The patient was then subjected to a series of tests which gauge ability to perform the activities of daily living. Of the 127 rudimentary functions tested, the patient could not carry out a single one unaided. He could not turn over in bed or sit erect in bed without support. A summary of this preoperative study reads, in part: "Even passive movements of the extremities were difficult to perform due to rigidity. The patient could not push himself up in a wheelchair, and could not grasp an object lying in front of him to raise it to his mouth."

It was decided to hazard surgical intervention and, with a nurse holding his hand, the patient managed to sign an "X" to signify his consent (Fig. 22A).

The left anterior choroidal artery was obliterated by electrocoagulation on May 3, 1954. The following day, the patient was drowsy but responsive. Tremor and rigidity were absent from the right extremities but still present on the left. Motion was present in all extremities, much better on the right than on the left. Since that time, neither tremor nor rigidity has been noted in the right extremities. Ability to perform fine movements with the right hand is exemplified by the handwriting specimens (Fig. 22B, C and D). There was remarkable improvement in speech, as noted in detail under "Speech." The patient could walk unaided (Fig. 21B), feed himself, get in and out of bed, and attend to toilet functions within two weeks after operation.

The patient could articulate more distinctly, his facial expression became more natural, and the mimicry of his facial musculature more vivid. He was able to smile and did so frequently. The patient can now feed himself, get in and out of bed without assistance, stand and walk unaided, go up and down stairs, and can run if asked to do so. Prior to his discharge, he helped on the ward by carrying pillows and blankets. He was very sociable. He was discharged entirely ambulatory.

DISCUSSION

Mechanism

It has been a handicap to the surgical or other treatment of parkinsonism that the nature of the underlying disturbance has never been well understood. The precise role of the several extrapyramidal nuclei and their interconnections remains unknown and, even if it were decided to abolish the function of a given nucleus, it would not be feasible to do so on the strength of present inaccurate knowledge of the blood vessels concerned. For example, it is interesting that occlusion of the anterior choroidal artery in 40 instances has failed to produce what is termed the "syndrome of the anterior choroidal artery." The widely accepted hypothesis of Bucy (17) assumes that resting tremor is the result of excitation of the pyramidal tract or its origin in Betz cells following release of a portion of the pyramidal system to abnormal activity, owing to destruction of the substantia nigra and/or the globus pallidus. This hypothesis is not well borne out by the effects of induced ischemia of the globus pallidus in our cases. The subcortical nuclei which Bucy stated to be destroyed in parkinsonism are not, in fact, totally destroyed; they may show signs of inflammation, but they often appear relatively normal. As long ago as 1942, Meyers (18) showed that surgical removal of the globus pallidus and surgical section of its efferent fibers actually relieved, rather

than caused, tremor. Nevertheless, Bucy (1) in 1948 recognized no new findings that would controvert his hypothesis.

Unfortunately the question is not at all academic because, lacking better information, surgeons have chiefly attempted to control hyperkinetic disorders by the only scheme in sight (namely, resection of portions of the pyramidal system (1, 2)), thus substituting paralysis for tremor. In some of the patients undergoing cortical extirpation seizures developed postoperatively; Putnam (3) mentions, in addition, aphasia. Putnam's method of sectioning pyramidal fibers in the cervical cord was said to permit a later return of motor power, but Browder (19) has reported that tremor also returns. Putnam warned that these were treatments only of tremor, not of parkinsonism, and that severe rigidity precluded an improvement of function. In Walker's (20) more recent operation the pyramidal tract is sectioned at the cerebral peduncles, again without influence upon rigidity or other symptoms except tremor, and upon tremor only to the extent of a compromise between it and paralysis.

Browder (21) recommended section of the anterior limb of the internal capsule, with resection of the margins of the putamen and pallidum. The result of this operation is a hemiplegia that gradually lessens, while tremor is abolished or improved in the paretic extremities. At least the procedure is not solely aimed at the pyramidal system, and it favorably influences rigidity.

A more direct attack on the neural structures that appear to be concerned in parkinsonism is the formidable technique of Meyers (18), *i.e.*, section of pallidofugal fibers; this controls rigidity as well as tremor, but is complicated by fairly high mortality, and at times by epilepsy and monoplegia. Meyers himself did not consider that he had evolved a method of treatment, but his studies form an outstanding contribution to the understanding of parkinsonism. Spiegel and Wycis (22) have introduced the use of a stereotaxic instrument to attack the ansa lenticularis, whereas Fenelon (23) and others coagulate the ansa directly. Both are promising techniques.

Neither pallidofugal section nor pallidal ischemia directly explains how parkinsonism is brought about; incrimination of the globus pallidus does not by any means identify its actual role, and the chief advance is that old hypotheses now stand in considerable doubt, while newer ones need substantiation. One line of speculation is as follows: The impulses which engender tremor and rigidity may arise from pallidal and other subcortical neurons as a result of injury-activity, similar to the firing of diseased anterior-horn cells in amyotrophic lateral sclerosis. It is possible that alternate firing into reciprocally innervated muscles might lead to tremor, whereas simultaneous firing would cause rigidity. Then total destruction of those neurons (or cutting off their outflow) would be expected to alleviate both tremor and rigidity, as the arterial occlusion (or the operation of Meyers) seems to exemplify.

Now, it is well established that neuronal lesions due to such conditions as infection or trauma can result in discharges which produce abnormal motor activity that may involve single motor units (fasciculation) or the entire body (epilepsy) for years afterward. It is not presumptuous to postulate that viral in-

jury to neurons in the globus pallidus can similarly result in discharging lesions that produce tremor and rigidity. Other lines of speculation are also attractive, and they are numerous. For example, Magoun (24) has raised the possibility that tremor results from an abnormal timing of descending extrapyramidal impulses. In a masterly discussion and demonstration of the extrapyramidal system, Mettler (25) has shown that stimulation of the pallidum may produce a state of plastic tonus in the contralateral extremities.

Alexander (8) has made the interesting suggestion that the medial globus and certain other subcortical nuclei which depend principally on the anterior choroidal artery are, by virtue of this blood supply, especially vulnerable to disease. If so, and if the lesion which causes tremor and rigidity is in fact a discharging irritative lesion, then it is not surprising that this artery should lead to the proper area to obliterate in order to relieve the symptoms of parkinsonism.

Although so much is speculation, the clinical observations in the present series of cases are fact:

Clinical observations

The two years of the present study have shown unequivocally that surgical occlusion of the anterior choroidal artery has reasonably constant effects on the disabilities of parkinsonism. Severe resting tremor and marked cogwheel rigidity have been markedly alleviated or entirely abolished in the contralateral extremities. Masklike facies, poverty of movement, monotonous, inaudible speech and characteristic locomotion have all been improved remarkably. Neither motor power nor sensation has been sacrificed. The result has been demonstrated in a sufficient number of cases, and indirectly confirmed by inadvertencies, to establish the effect of this operation with certainty. Moreover, with the passage of time, better results have been secured and the hazards of the procedure have been reduced. The 6 patients who have now been followed between twelve and twenty-four months have had no recurrence of tremor, rigidity or other disability.

In previous reports (6, 7) occlusion of the artery was regarded as an investigative technique that might be applied in far-advanced parkinsonism with complete disability. It is now felt that, within its limitations and in selected cases, the operation should be regarded as therapeutic, and is so recommended.

Confirmatory results

Hoen (15), Pool (26), Gardner (27) and Bertrand (28) have each informed the author of at least 1 successful experience with this procedure. Pool has performed the operation bilaterally in 1 patient and obtained good results that were still apparent a year later. MacLean (16) has described 3 very good results. Fairman (29), in Buenos Aires, has reported 10 cases. He found the hazard of operation great in aged arteriosclerotic patients, but the results were excellent in postencephalitic and idiopathic parkinsonism. His follow-up studies have been encouraging, and his results have improved with increasing experience. Caron (30), in France, has termed the immediate results most satisfactory in 5 patients undergoing operation on one or both sides, and has noted no postoperative pyramidal-tract defect,

sensory defect, or hemianopsia. From our experience, we would add the comment that the results to be expected by other observers will largely depend on the completeness with which the artery is obliterated.

Selection of cases

Originally the candidates for this new, experimental, and hazardous procedure were patients completely disabled, and often those actually bedridden and vegetative. They afforded an especially severe trial of the operation, for, as we have since learned, the morbidity and mortality are closely proportional to the patient's debility. The operation should be considered in moderately advanced parkinsonism (*e.g.*, Cases 4, 6 and 7) as well as in far-advanced disease with complete incapacitation. Patients with rigidity and tremor limited to one side (Case 7) have had the most uneventful convalescences, and are regarded as excellent candidates for the procedure. Those with difficulty in swallowing, marked drooling, advanced debility and a history of extreme susceptibility to heat are liable to show a higher morbidity and mortality but, nevertheless, may do well (Cases 2, 3 and 5).

Most of the present series of patients had bilateral parkinsonism. Generally, however, we occluded the artery of only one side. Relief of tremor and rigidity on one side alone has afforded gratifying improvement in disability (Cases 3, 4 and 5) and has appeared to present a lower mortality than bilateral operation (even if performed in two stages). We do not, unfortunately, have enough information to pronounce categorically whether or not a bilateral operation is worth while.

We advise that the operation be limited to patients under the age of 55. It is our impression that the hazards are greater in older subjects, even though they may show beneficial results (*e.g.*, Case 3). Fairman, as mentioned, has this view also.

Evaluation

Results of occlusion of the anterior choroidal artery, as reported here, seem to justify a more hopeful view of the management of parkinsonism than has been possible heretofore; they certainly fail to bear out the authoritative pessimism about neurosurgical approaches in general (1, 4). For having penetrated the aura of hopelessness in this syndrome, we are indebted to the surgical investigations of Meyers; and it is to be hoped that further surgical and medical investigations of hyperkinetic disease will be inspired by a judicious optimism.

This is not to suggest that occlusion of the anterior choroidal artery will, or should necessarily, become a standard procedure in the treatment of parkinsonism; although that is possible, many years of work would be required to establish it, and by that time better techniques or more useful drugs may supplant this approach entirely. Such determinations are left for the future.

The operative risk of this procedure has been considerable, owing in part to the condition of the patients in whom it was first attempted, and in part to the hazards and difficulties peculiar to a new technique. Thus, although the mortality has been 10 per cent in the present series, the total risk is yet to be defined. It can

be minimized by further technical experience and by more clear-cut criteria for the selection of patients—all of which will evolve in due time. Even so, the true evaluation of this procedure will depend on its cautious, judicious use.

SUMMARY AND CONCLUSIONS

1. The gross anatomy, surgical anatomy, and arteriographic anatomy of the anterior choroidal artery have been described.

2. The effects of occlusion of the anterior choroidal artery in parkinsonism have been summarized, and illustrated by 8 representative case reports.

3. Documented results have been presented which demonstrate that surgical occlusion of the anterior choroidal artery in parkinsonism can alleviate resting tremor and cogwheel rigidity in the extremities contralateral to operation. Moreover, advanced disability, masked facies, propulsion and retropulsion, impoverished speech and deformities have been reversed in certain cases following this procedure.

4. The average duration of tremor and rigidity in the cases reported was 15.6 years prior to operation. The hazards of operation appear to be proportional to the degree of debilitation and vegetative abnormalities which exist preoperatively. The surgical risk is increased in patients over the age of 55.

5. The good results produced by the operation have thus far endured for periods varying from twelve to twenty-four months, in cases in which the vessel was properly obliterated. No prediction regarding the ultimate duration of the alleviation of tremor and/or rigidity is possible. The knowledge that the course of parkinsonism has always been relentlessly progressive makes the outlook guarded in terms of extended follow-up studies. Cautious, watchful waiting will supply the answer to this aspect of the problem.

REFERENCES

1. Bucy, P. C.: Cortical extirpation in the treatment of involuntary movements, *Am. J. Surg.* **75:** 257–263 (Jan.) 1948.
2. Klemme, R. M.: Surgical treatment of dystonia, paralysis agitans and athetosis, *Arch. Neurol. & Psychiat.* **44:** 926, 1940.
3. Putnam, T. J., and Herz, E.: Results of spinal pyramidotomy in the treatment of the parkinsonian syndrome, *Arch. Neurol. & Psychiat.* **63:** 357–366 (March) 1950.
4. Merritt, H. H.: *in* Parkinsonism and Its Treatment, edited by L. J. Doshay. Philadelphia, J. B. Lippincott Co., 1954, chapter 1.
5. Cooper, I. S.: Ligation of the anterior choroidal artery for involuntary movements, *Psychiat. Quart.* **27:** 317–319 (Apr.) 1953.
6. Cooper, I. S.: Effects of ligation of the anterior choroidal artery on involuntary movements, *Tr. Am. Neurol. A.* **78:** (in press).
7. Cooper I. S.: Surgical occlusion of the anterior choroidal artery in parkinsonism, *Surg., Gynec. & Obst.* **99:** 207–219 (Aug.) 1954.
8. Alexander, Leo: The vascular supply of the strio-pallidum, *in* The Basal Ganglia—Proceedings of the Assoc. for Research in Nervous & Mental Disease. Baltimore, The Williams & Wilkins Co., 1942, vol. 21, pp. 77–132.
9. Morello, A., and Cooper, I. S.: Arteriographic anatomy of the anterior choroidal artery, *Am. J. Roentgenol.* (in press).

10. Abbie, A. A.: The morphology of the forebrain arteries with especial reference to the evaluation of the basal ganglia, *J. Anat.* **68:** 433–470 (July) 1934.
11. Abbie, A. A.: The blood supply of the lateral geniculate body, with a note on the morphology of the choroidal arteries, *J. Anat.* **67:** 491–521 (July) 1933.
12. Bassett, D. L.: A Stereoscopic Atlas of Human Anatomy. Section I. The Central Nervous System. Portland, Oregon, Sawyer's Inc., 1952.
13. Oliver, L. C.: Essentials of Neurosurgery. London, H. K. Lewis & Co. Ltd., 1952, pp. 198.
14. Oliver, L. C.: Parkinson's Disease and its Surgical Treatment. London, H. K. Lewis & Co. Ltd., 1953, pp. 87.
15. Hoen, T. I.: Personal communication.
16. MacLean, A.: Personal communication.
17. Bucy, P. C.: Surgical relief of tremor at rest, *Arch. Neurol. & Psychiat.* **122:** 933–941 (Dec.) 1945.
18. Meyers, R.: The present status of surgical procedures directed against the extrapyramidal diseases, *New York State J. Med.* **42:** 535–543 (Mar.) 1942.
19. Browder, J.: Discussion of Ebin, J.: Combined lateral and ventral pyramidotomy in the treatment of paralysis agitans, *Arch. Neurol. & Psychiat.* **63:** 528–529 (Mar.) 1950.
20. Walker, A. E.: Cerebral pedunculotomy for the relief of involuntary movements. II. Parkinsonian tremor, *J. Nerv. & Mental Dis.* **116:** 766–775 (Dec.) 1952.
21. Browder, J.: Section of the fibers of the anterior limb of the internal capsule in parkinsonism, *Am. J. Surg.* **75:** 264–268 (Jan.) 1948.
22. Spiegel, E. A., and Wycis, H. T.: Ansotomy in paralysis agitans, *Arch. Neurol. & Psychiat.* **71:** 598–614 (May) 1954.
23. Fenelon, F., and Thiebaut, F.: Results of neurosurgical treatment of parkinsonian rigidity by means of unilateral striopallidal intervention, *Rev. neurol.* **83:** 280 (Oct.) 1950.
24. Magoun, H. W.: *in* Parkinsonism and Its Treatment, edited by L. J. Doshay. Philadelphia, J. B. Lippincott Co., 1954, chapter 2.
25. Mettler, F. A.; Ades, H. W.; Lipman, E., and Culler, E. A.: The extrapyramidal system; and experimental demonstration of function, *Arch. Neurol. & Psychiat.* **41:** 984–985 (May) 1939.
26. Pool, J. L.: Personal communication.
27. Gardner, J.: Personal communication.
28. Bertrand, C.: Personal communication.
29. Fairman, D.: Personal communication.
30. Caron, J. P.: Personal communication.

ANTICOAGULANTS IN CARDIOVASCULAR DISEASE

GEORGE C. GRIFFITH, M.D.*

The Department of Medicine (Cardiology), School of Medicine, University of Southern California and the Los Angeles County Hospital, Los Angeles, California

Thromboembolic complications occurring in connection with cardiovascular disorders, particularly as complications of congestive heart failure and myocardial infarction, exact a heavy toll in disability, invalidism and death during the middle and later years. Interference with the normal circulation is an important factor in the formation of thromboemboli and, because of the sluggish circulation or altered rhythm almost invariably present in cardiovascular disorders, persons with major cardiovascular disease must be looked upon as potential sufferers from thromboembolic phenomena.

No evidence exists that the anticoagulants—heparin, the coumarin derivatives, or the phenyl-indanedione drugs—alter the course of atherosclerosis. The anticoagulants are helpful in preventing thromboembolism following acute myocardial infarction, thromboembolism associated with congestive failure or rheumatic heart disease, thrombophlebitis among older persons following surgery, and the formation of thrombi in main or collateral vessels in certain peripheral vascular diseases. The use of anticoagulants is fully warranted in these conditions and is not dangerous when controlled by an adequate prothrombin test. If a standard degree of hypothrombinemia is induced and maintained, all of the anticoagulants now in common use are of about equal value in the prevention of thrombosis.

The urgency of prevention or control of thromboembolic complications is apparent when we realize that among patients with recent coronary occlusion and myocardial infarction, for example, 1 in 7 will suffer a secondary infarction during convalescence from the original lesion. Frequently, a coronary infarct will be followed by occlusions outside the heart, which may prove more serious than the original lesion. In at least 50 per cent of patients with myocardial infarction mural thrombi develop, which may be superimposed upon atheromatous plaques and cause gradual arterial occlusion, or may give rise to emboli which may then block pulmonary or other vessels. It has been estimated that of every 2 fatalities occurring during the acute stage of myocardial infarction, at least 1 is preventable if secondary complications are avoided.

Anticoagulants should be administered in all cases of acute myocardial infarction, irrespective of the apparent severity of the lesion, as the development of thromboembolic complications following myocardial infarction cannot be predicted in the particular case. Not only does intravascular clotting predispose to further clotting, but stasis is an important factor in thrombus formation, and the enforced rest immediately following acute infarction may contribute to this

* Professor of medicine, Coordinator of Cardiovascular Diseases, University of Southern California School of Medicine.

tendency. With anticoagulant therapy, it is possible to reduce the mortality rate in patients who survive the first episode of infarction.

At the University of Southern California, we have been interested particularly in the use of anticoagulants for the prevention and control of thromboemboli in cases of rheumatic heart disease and congestive heart failure. Thromboemboli were found in roughly one third of 565 patients with these diseases on whom autopsies were performed at the Los Angeles County Hospital; they were the direct cause of death in 1 of every 5 patients (1). Our studies demonstrate that the mortality among patients with rheumatic heart disease and congestive heart failure who receive adequate treatment with anticoagulants is only half the mortality among those who are untreated (2).

Thromboembolic phenomena are also frequent complications in a variety of vascular disorders, particularly those of an obliterative nature. They often follow crushing injuries to medium-sized or large veins, or occur after surgical operations in older patients. The exact incidence of thromboembolic complications is unknown. However, many deaths attributed clinically to other cardiovascular conditions prove at necropsy to be due to thrombus formation or emboli.

ANTICOAGULANTS

Anticoagulants interfere with the normal clotting mechanism of the blood, making it temporarily hypocoagulable. Such drugs are lifesaving because of their ability to prevent the initiation or propagation of thrombi, with subsequent liberation of emboli into the bloodstream and possible disastrous occlusion of a major pathway. These compounds are of two kinds:

1. Heparin and heparin-like compounds, which act directly on clotting substances already present in the circulating blood. Heparin reduces the conglutination of platelets, thereby inhibiting the liberation of thromboplastinogenase; it prevents the combination of fibrin and thrombin; and, when coupled with a plasmatic complement fraction, acts as a prothrombin antagonist. Because of its direct effect on clotting substances in the blood, the action of heparin is immediate and is established within a very few minutes.

2. Preparations, including Dicumarol and other coumarin compounds, which exert a less direct effect upon the coagulability of the blood. Dicumarol modifies the ability of the liver to utilize vitamin K in the synthesis of prothrombin. Because of its mode of action, a lag occurs between the time of ingestion and the time the effects become manifest in hypocoagulability of the blood. From forty-eight to seventh-two hours are required for the anticoagulant action of Dicumarol to reach its height.

SPECIFIC ANTICOAGULANTS: THEIR ADVANTAGES AND DISADVANTAGES

If a standard degree of prothrombinemia is induced and maintained, all the anticoagulants now commonly employed are of about equal value in the prevention of thrombosis, and their use is attended by approximately the same risk of hemorrhage. The drugs differ in their potency (milligram for milligram)

according to method of administration, in the rapidity with which desired levels of hypoprothrombinemia can be induced and maintained, and in the speed with which the resultant hypoprothrombinemia can be corrected if conditions should arise which demand a rapid return to normal prothrombin levels. Individual differences also occur in the reaction to specific anticoagulants.

Heparin: The main advantages of heparin are the promptness of its action—a matter of minutes—and the ease with which its effect on the coagulation time can be determined at the bedside. Heparin is not effective when given orally, but it may be administered subcutaneously, intravenously, and/or intramuscularly. Ordinarily, its effect diminishes over a period of three to four hours, but more lasting effects may be produced by administering heparin in a vehicle which releases the drug slowly. In case of overdosage or the need to return the blood coagulability to pretreatment levels, the effects of heparin may be neutralized by the administration of protamine sulfate or toluidine blue. Although too expensive for long-term use, heparin is usually administered together with slower-acting coumarin derivatives in instances in which immediate protection from thromboembolic complications is required, heparin being discontinued after the slower-acting anticoagulant has reached the peak of its effectiveness. Heparin is also of value during the periods of resistance to coumarin derivatives; this resistance may occur in the re-establishment of anticoagulant therapy after interruption of therapeutic hypothrombinemia by vitamin K_1 administration. (This last point is discussed in more detail in the subsequent section on hemorrhage and its correction).

Dicumarol: Dicumarol is probably the anticoagulant in widest use at the present time; it is inexpensive and may be administered orally. Its chief drawback is the lag of forty-eight to seventy-two hours before its peak effectiveness is attained, during which time the patient is not protected fully against possible thromboembolic complications. This difficulty is usually surmounted by the co-administration of heparin during the first hours of therapy, if immediate hypoprothrombinemia is deemed necessary. Dicumarol dosage should be regulated by daily prothrombin determinations.

Tromexan: Another coumarin derivative, Tromexan, which is approximately one fifth as potent as Dicumarol, furnishes somewhat more rapid initial protection for the patient and permits a more rapid return of prothrombin levels to normal after the drug is withdrawn (3). Tromexan has a tendency to provoke an excessive response and, therefore, should be given in divided daily doses if stable results are to be obtained. Heparin should be administered during the first hours of therapy in order to assure full protection for the patient.

Anticoagulant No. 63: A third coumarin derivative, known as Anticoagulant No. 63, affords more prolonged protection than either Dicumarol or Tromexan, and therefore requires less frequent administration (4). It is two or three times as potent as Dicumarol and acts about as quickly. Although fluctuations in prothrombin response are very marked during the first few days of Tromexan therapy, and only somewhat less so with Dicumarol, response to Anticoagulant No. 63 is more stable. No patients are entirely resistant to Anticoagulant No. 63,

although approximately 10 per cent are resistant to Tromexan, and 8 per cent are resistant to Dicumarol.

If excessive hypoprothrombinemia develops following administration of a coumarin compound, vitamin K may be used to restore prothrombin time to pretreatment levels. Vitamin K_1 should rarely be used for this purpose; although it acts more quickly than vitamin K—taking effect within two hours—vitamin K_1 often overcorrects the temporary prothrombinopenia following overdosage with coumarin compounds; its use results in a hyperprothrombinemia which remains resistant to coumarin compounds for a period of two to three weeks. Heparin remains effective under these conditions and may be used during the period of refractoriness to coumarin compounds following vitamin K_1 administration.

Dipaxin: A comparatively new anticoagulant, Dipaxin, has been used at the Los Angeles County Hospital for about a year, during which time it has been administered to over 250 patients without untoward results. In 15 patients, Dipaxin provided satisfactory prophylactic care for periods of up to eight months. Daily prothrombin levels are not necessary when using Dipaxin; a single biweekly determination provides adequate control. Vitamin K_1 oxide will neutralize Dipaxin and restore prothrombin to the pretreatment levels.

Two substitutes for heparin, Paritol and Treburon, have received a limited trial. Occasional serious results have led to the abandonment of Paritol. Treburon, which has about one third the potency of heparin, has been suggested as a less costly substitute for the earlier drug. It has a more sustained action than heparin —about twelve hours—and may be administered either intravenously or intramuscularly. Treburon may be neutralized by injections of protamine sulfate.

INDICATIONS FOR ANTICOAGULANT THERAPY

The utilization of anticoagulants in the treatment of cardiovascular disorders has resulted in a striking reduction in the incidence and extent of thromboembolic complications. Especially noteworthy are the beneficial results of therapeutically-lowered prothrombin levels following recent coronary occlusion and myocardial infarction. Anticoagulants also have proved very effective in the prevention and control of thromboemboli associated with rheumatic heart disease and congestive heart failure. Immediate anticoagulant therapy should be initiated in cases of pulmonary embolism in order to prevent the likelihood of further, possibly fatal, embolism.

Administered prophylactically, anticoagulants tend to forestall the development of thromboembolic phenomena in peripheral vascular disorders such as Buerger's disease, thrombophlebitis and phlebothrombosis, and to prevent the development of both the sudden and gradual arterial occlusions that occur commonly subsequent to these disorders (5). In the diabetic, administration of anticoagulants makes feasible conservative treatment of lesions of the lower limbs.

I have mentioned the importance of anticoagulants in combating the effects of the period of enforced rest immediately following acute myocardial infarction. Stasis is probably the most common factor leading to the development of thrombi

in the femoral veins, and any conditions promoting stasis (such as postoperative convalescence or inactivity in the aged) are indications for anticoagulant therapy (6).

When operations on large arteries are undertaken, anticoagulants prevent the formation of a new thrombus at the freshly sutured site of arteriotomy. Anticoagulants are also important in the prevention of thromboembolic complications following operations in the abdominal and pelvic regions, and in the presence of various malignancies. They are particularly important as prophylactic agents after operation in older individuals. Anticoagulants are also of decided value in the treatment of thrombosis of the retinal vessels.

During periods of active intravascular clotting, it is probably necessary to depress prothrombin levels to 10–20 per cent of normal. Prothrombin levels of 40–50 per cent offer sufficient protection on a long-term prophylactic basis.

In the ambulant patient. We have found anticoagulants of particular value in the management of cardiovascular disease in the ambulant patient, who is thus often spared long periods of invalidism. It has been our experience that anticoagulant therapy on an ambulant basis gives satisfactory results, even in patients with threatened acute myocardial infarction. When episodes of infarction do occur, they are not ushered in with the abruptness, nor do they follow the acute pattern common in patients not receiving anticoagulant therapy.

CONTRAINDICATIONS TO THE USE OF ANTICOAGULANTS

The presence of a lesion of the brain or spinal cord is an absolute contraindication to the use of anticoagulants; in these areas, even minute extravasations of blood will produce decided and possibly irreversible damage. Relative contraindications—in which the benefits to be derived from administration of anticoagulants must be weighed against substantial hazards of hemorrhage—include:

1. Blood dyscrasias, in which hemeostasis is impaired or lost,
2. Impaired renal function, which results in the retention of cumulative amounts of anticoagulant in the body, and thus increases the possibility of hemorrhage in organs particularly vulnerable to bleeding,
3. Instances in which considerable areas of skin have been denuded of their covering,
4. Ulceration of the gastrointestinal tract,
5. Undernutrition, or disorders of fat digestion (which cause excessive reaction to oral anticoagulants),
6. Liver disease, which constitutes a contraindication on two counts: a) production of vitamin K is impaired, and b) the condition is usually accompanied by undernutrition,
7. Carcinoma of the prostate gland with metastases; the excess proteolytic enzyme produced by the metastatic prostatic tissue destroys many of the coagulation factors normally present in the blood (7).

Anticoagulants should be administered with caution to patients who have received large amounts of antibiotics, because vitamin K production and absorption are impaired in these patients.

THE PROBLEM OF HEMORRHAGE

The problem of hemorrhage during anticoagulant therapy is greatly stressed in the literature. Recently, for example, there have been reports of occasional cases of cardiac tamponade during anticoagulant therapy following myocardial infarction (8). (In over 800 cases receiving anticoagulants at the Los Angeles County Hospital, we have yet to observe this occurrence.) If hemorrhage were a common result of the administration of anticoagulants, this fact would constitute a formidable obstacle to such therapy.

We were interested, therefore, in noting the incidence of hemorrhage among patients treated with anticoagulants as compared with the frequency of hemorrhage among a comparable group not receiving anticoagulants. Included in this study were 627 patients under treatment at the Los Angeles County Hospital for congestive heart failure. Of these, 416 received anticoagulant therapy; 211 constituted a control group. The incidence of hemorrhage in the treated group (2.9 per cent) closely approximated the incidence of hemorrhage in the control group (2.8 per cent). Both major and minor hemorrhages occurred with the same frequency in patients receiving anticoagulants as in patients not receiving them. Obviously, administration of anticoagulants was unimportant as a cause of hemorrhage among the patients in this series, and the oft expressed fear that these drugs will increase subintimal bleeding is without foundation.

In this study, at no time was hemorrhage encountered following administration of the coumarin drugs, when the prothrombin level was above 10 per cent. In our experience there has been no hemorrhage attributable to anticoagulant therapy when therapeutic limits have not been exceeded. Nevertheless, administration of an excessive amount of anticoagulant results in a toxic condition, during which capillary permeability and capillary fragility are increased and the possibility of hemorrhage is heightened.

It is true that the incidence of hemorrhage is higher in the older age groups, *i.e.*, those that benefit most from anticoagulant therapy. This is a reflection of the more frequent presence among older persons of conditions in which bleeding may be expected. Bleeding from existing lesions is exaggerated under the influence of anticoagulants; but, if used within therapeutic limits, these drugs do not initiate bleeding.

SURGICAL PROCEDURES DURING ANTICOAGULANT THERAPY

Clinicians often withhold anticoagulants from patients who would benefit from such therapy, in the fear that operation may become necessary. As experience with these preparations is extended, an increasing number of surgeons (9) report that they prefer to continue anticoagulants even up to the time of surgery, trusting to gelatin sponges to provide sufficient hemostasis at the site of operation[1]. If the operation is for removal of thromboembolic material, surgeons often prepare the patient by preliminary heparinization, even if there has been no

[1] Gelfoam and fibrin foam are neutral in their reaction. However, oxidized cellulose (Oxycel) is acid in its reaction, and will inactivate thrombin unless sufficiently neutralized before use.

other preoperative anticoagulant therapy. They prefer to risk bleeding at the time of operation—when they can cope with it immediately—rather than risk the formation of hematomas at the site of operation, which might result if heparinization were started later. The occasion for surgery is an important consideration. For example, if operation is performed for the removal of a thrombus, the walls of the vessel have been ruptured and there is risk of further bleeding; on the other hand, if operation is performed for the removal of embolic material; no such risk is present.

Other investigators—more cautious, or less adept at anticoagulant therapy—prefer to discontinue anticoagulants early enough to permit the blood to return to pretreatment levels before operation. They may employ either vitamin K or whole blood transfusions, or both, in counteracting the effects of the anticoagulant. In the laboratories of the University of Southern California, we have found that vitamin K gives us the best results. Vitamin K_1 will neutralize the effects of the anticoagulant within two hours; however, refractoriness to the coumarin drugs will follow for a period of two to three weeks.

SUMMARY

The utilization of anticoagulants in the treatment of cardiovascular disorders has resulted in a striking reduction in the incidence and extent of thromboembolic complications. Many physicians, however, are denying anticoagulant drugs to patients who would benefit from their use, because of the fear of promoting hemorrhage. If the drugs are employed intelligently and judiciously, the benefits of anticoagulant therapy far outweigh the hazards.

REFERENCES

1. Griffith, G. C.; Stragnell, R.; Levinson, D. C.; Moore, F. J., and Ware, A. G.: A study of the beneficial effects of anticoagulant therapy in congestive heart failure, *Ann. Int. Med.* **37:** 867–887 (Nov.) 1952.
2. Levinson, D. C., and Griffith, G. C.: Evaluation of anticoagulant therapy in congestive heart failure, *Circulation* **4:** 416–419 (Sept.) 1951.
3. Wright, I. S.: A comparative evaluation of Tromexan and Dicumarol, *in* Transactions of the Fifth Conference on Blood Clotting and Allied Problems. New York, N. Y., Josiah Macy, Jr. Foundation Publications, 1952, pp. 30–91.
4. Barker, N. W.: Clinical evaluation of the newer anticoagulants, *Ibid.*, pp. 13–29.
5. Marple, C. D., and Wright, I. S.: Thromboembolic Conditions and Their Treatment with Anticoagulants. Springfield, Ill., Charles C Thomas, Publisher, 1950.
6. Wright, I. S.: The Pathogenesis and Treatment of Thrombosis, with a Clinical and Laboratory Guide to Anticoagulant Therapy. New York, N. Y., Grune & Stratton, 1952.
7. Stefanini, M.; Campbell, E. W.; Plitman, G. I., and Salomon, L.: Coagulation defects due to acquired anticoagulants and fibrinolysis; their detection and treatment, *Bull. New England Med. Center* **15:** 23–31 (Mar.) 1953.
8. Rose, O. A.; Ott, R. H., Jr., and Maier, H. C.: Hemopericardium with tamponade during anticoagulant therapy of myocardial infarct, *J.A.M.A.* **152:** 1221–1223 (July 25) 1953.
9. Laufman, H.; Preston, F. W., and Bourdeau, R.: Efficacy of hemostatic agents in the presence of anticoagulant therapy, *Tr. Western Surg. A.* **58:** 250–259, 1951.

HERPES ZOSTER: REVIEW, WITH PRELIMINARY REPORT ON NEW METHOD FOR TREATMENT OF POSTHERPETIC NEURALGIA

FRANCIS SCHILLER, M.D.*

Department of Neurology, University of California Medical School, San Francisco, California

To what category of ill-health does postherpetic neuralgia belong? By an old tradition we tend to classify diseases primarily into curable ills ending in recovery, and incurable ones resulting in death. Geriatrics, however, deals with many complaints that neither kill nor quit their victims. Not death, but life with an untractable condition, threatens the patient and challenges his physician. No objective progression of the disease, but only the accumulated days and years of suffering, give the afflicted a feeling of deterioration, or lead to actual prostration. One thus hesitates to speak of a disease process. Conditions of this sort are the after-affects of disease—the result of tissue loss with inadequate repair. They are internal mutilations on a microscopic scale.

Among the disorders of non-regenerating nerve cells we particularly find those partial fatalities which are compatible with the survival of the nervous system and the organism as a whole, but not with well-being. Postherpetic neuralgia is such a stagnant condition. It follows a disease which has run its course: the neuralgia is the ghost of a herpes zoster which cannot find rest.

Without the complication of postherpetic neuralgia, herpes zoster is a self-limiting disease. It is more common in the elderly, but by no means confined to them. In younger people the acute stage is also often painful, but chronic sequelae rarely occur. The incidence of postherpetic neuralgia has apparently not been reported. Both sexes are about equally affected (1).

PATHOGENESIS

The disease has many fascinating aspects. On the immunologic side, the question of viral origin can probably be answered in the positive. Small epidemics have been reported. Moreover, the fluid from herpetic vesicles has been shown to produce varicella in children (2). Identical eosinophilic inclusion bodies have been found in the vesicles of both varicella and herpes zoster (3). Herpes zoster has developed in adults exposed to children with varicella, and adults affected with herpes zoster seem to have likewise transmitted the virus to children who contracted chickenpox. Such instances, however, are rare and the relationship between the two diseases is not clear (4, 5, 6).

The inflammatory and infective nature of herpes zoster is borne out by the enlarged regional lymph nodes, and the mild pleocytosis in the cerebrospinal fluid. There are histopathologic changes in the spinal and sympathetic ganglia (7, 8) and in the posterior-horn cells of the spinal cord (9), and there is a definite relationship to meningo-myelo-encephalitis (10, 11). Hence the disease has also been called posterior poliomyelitis (11). In rare instances the anterior horns and

* Clinical Instructor in Neurology.

even the long motor tracts in the spinal cord may be affected and lead to upper or lower motor neuron paralysis (12, 13).

With regard to pathogenesis it is now commonly believed that the skin eruption is secondary to the affection of one or more bulbar or spinal roots, and the herpetic vesicles are distributed in the precise cutaneous territory related to these roots (7). The virus is thought to travel distally along the nerves to be deposited at their epidermal endings (5, 14). One reason for this belief lies in the fact that pain and raised temperature usually precede the skin eruption. That the vesicles are no mere trophic manifestations of a sensory neuronitis is borne out by the contagious nature of the vesicular fluid (2, 14, 15), the pathologic changes in the peripheral nerves, and the failure of nerve blocks to stop extension of the disease (6).

Of the two categories, "idiopathic" and "symptomatic" herpes zoster (7), the second is the result of mechanical or chemical injuries to sensory nerve roots. Though rare, the occurrence of "symptomatic" zoster adds weight to the theory that spinal sensory neurons are involved primarily in all cases.

No segment of the neuraxis is exempt from the affection, including the cranial nerves. Cases in point are the Gasserian ganglion and hence the ophthalmic branch of the trigeminal nerve supplying the cornea, or the geniculate and vagus ganglia with their ramifications around the ear, throat and neck. The dermatomes of the trunk are most commonly involved; ophthalmic zoster is next in frequency but probably foremost in severity and intractability (1). Bilateral (16), as well as recurrent herpes zoster (11), has rarely been reported.

DIAGNOSIS

Pain not only precedes the eruption but, accompanied by itching and paresthesia, it may last during the days of the vesicular stage. The pain usually subsides as the vesicles heal to form the depigmented spots which outline the affected dermatome. Occasionally the pain lingers on for a few weeks. It is only in cases of pain following this period that we truly speak of postherpetic neuralgia. No prediction can be made about its duration. In favorable cases it will last only for months; in unfavorable cases for years and even to the end of the patient's life. Suicides from this cause are on record (17).

The pain has two main features. One is a constant annoying, tingling, burning and stinging in the affected segment of skin. The other consists of paroxysms, usually in repetitious groups or bouts, of excruciating sharp stabs recurring in the same area many times a day. Although the first type resembles causalgia, the second, more severe type, is not unlike the pain of tic douloureux. Postherpetic neuralgia shares intensity of pain with both these conditions and with so-called "thalamic" pain, and the patient tries to protect the affected area against any sort of stimulus. The discomfort is almost continuous and spontaneous; in addition it is aggravated by any contact, even the friction of clothing.

Examination leaves no doubt about the diagnosis. It should not be made unless there is the shoal or dotted band of grayish pock-like scars which outline a length, but hardly ever the whole dermatome. Not only these depigmented spots —ranging from pinhead to lentil size—have abnormal sensation, but also the

normal appearing skin between and beyond them. The affected part of the dermatome is the seat of paradoxical sensory reactions. Discrimination between sharp and blunt, hot and cold, and between two individual points is diminished. On the other hand, a light touch or faint rub produces anything from an annoyed start (due to an increase in the dysesthesia) to a violent knife-like pain. It is, in other words, characteristic of the affected skin territories to be both hypoesthetic and hyperalgesic. Sometimes firm pressure is tolerated, but never a lightly stroking movement.

TREATMENT

The intractability of the pain must be ascribed to permanent pathologic changes. There is loss of sensory and internuncial nerve cells, which are destroyed by the acute hemorrhagic inflammatory process. Such destruction has been seen both in the spinal and sympathetic ganglia (7, 8), and in the posterior horns of the spinal cord (9). The latter site of the lesion may be particularly responsible for the protracted pain. The reduced numbers of neurons in these structures survive in relative isolation. Their connections are, moreover, partly blocked by glial proliferation. It is easy to understand the loss of sensation under such conditions, but we can only speculate about the cause of the pain which stays after the phase of acute irritation is over. It seems that partial destruction of neurons and the resulting imbalance of impulses between the survivors, is responsible for the abnormal firing of the pain mechanism. As in other conditions of chronic and essentially "central" pain, the new kind of "irritation" is probably the result of unbalanced or mutually uninhibited impulses. The respective contributions of the somatic and sympathetic nervous systems, especially of the latter, are still a matter of conjecture. Peripheral vasomotor and trophic manifestations alone certainly cannot explain the symptoms.

Naturally, many remedies have been advocated. Most reports on this long list, however, deal with the alleviation of pain in the acute stage of the zoster eruption rather than with postherpetic pain. Unfortunately, the distinction between the initial neuritis and the subsequent neuralgia is not always made. The fact that the acute disease is self-limiting, and the severe pain as a rule only of a few days' duration, detracts from many claims of a cure. It is, therefore, a fallacy to believe that these remedies are effective in cases of chronic neuralgia, even if they seem to be so in the acute condition.

On the assumption that pain mechanisms have a self-perpetuating tendency, it is particularly advisable to keep the patient comfortable during the acute stage. The analgesic measures discussed here are therefore employed early, with a hypothetical view to preventing postherpetic neuralgia.

Broadly speaking, remedial attempts fall into four categories: 1) common analgesics, 2) remedies designed to improve the metabolic or immunologic milieu of nerves, 3) procedures protectively blocking and interrupting the nervous inflow from the peripheral lesions, 4) devices (other than those in the first category) specifically directed toward the central nervous system.

1. *Common analgesics.* All that need be said about this group is that aspirin with codeine, in judicious doses, is usually indispensable. Opiates and Demerol,

on the other hand, should be withheld as much as possible, especially if life expectancy is good. Cordotomy and lobotomy (see fourth category) are probably preferable to inducing addiction to drugs in patients whose general condition is satisfactory. Pontocaine in ¼ per cent aqueous solution, given in doses of 10 cc. intravenously several times a week, has been found effective by Livingston and Bonica (18).

Barbiturates and other sedative drugs also have a definite place. They are helpful in reducing the nervous tension which is an integral part of any pain, and in providing sleep for the patient exhausted by insomnia. The generally low tolerance to barbiturates of the elderly should be kept in mind. Closely connected with the subject of sedatives is the matter of the physician's attitude. Although he cannot hold out false hopes, he can be reassuring if he shows himself sympathetic with this unbearable complaint as well as fully conversant with its nature, which is essentially benign.

2. Among the *remedies designed to improve the metabolism* of the affected nerve structures, the following deserve brief discussion: (a) Varicella and other vaccines (19). These can hardly be expected to alleviate pain after the antigen has been dealt with and nothing but scars remain. (b) Pituitrin (2) is not only somewhat dangerous in the elderly with cardiovascular disease but also ineffective in the neuralgic state. Its action, if any, is obscure. (c) Cobra venom for chronic pain has had its vogue at certain times and in certain localities. The most recent controlled study of its action in general is none too favorable (21); however, the single included case of postherpetic neuralgia seems to have responded fairly well. Up to 50 mouse units or more daily are required, and relief sets in only after one to four weeks (22). (d) Protamide (23), essentially a proteolytic enzyme, may be effective in the stage of cutaneous eruption; it does not ameliorate the neuralgia, and cannot be expected to do so. (e) Vitamin B_{12} has a reputation for curing neuritic and neuralgic ills (24). We have seen 1 patient with relatively mild postherpetic pain derive some benefit. In large doses (1,000 micrograms once or twice weekly intravenously) vitamin B_{12} induces a certain well-being in the elderly. As an antineuralgic agent it is worth trying, as it may improve the metabolism of those nerve cells which are not irreversibly damaged. B_{12} has replaced thiamin, which is now considered ineffective (25). (f) Successes have also been reported with tetraethylammoniumchloride, given intravenously, on the assumption that its sympatholytic action might be beneficial (26).

3. *Local therapy.* Local heat is usually ill tolerated by the truly neuralgic, in contrast to its traditional effects on some chronic inflammatory conditions of mesenchymal tissues. Application of cold in the form of an ethylchloride spray is often beneficial, but the effects are too short lived to form the basis of a reasonably planned regimen. Protection of the hyperalgesic skin with collodion and plastic solutions seem to provide less comfort than one would expect, and may be downright uncomfortable.

Blocks of afferent impulses from the painful area have been of two kinds: local (27–29) and paravertebral (30–34). Cocaine and its derivatives in water or oil have been used, as well as paravertebral x-ray therapy and rhizotomy.

Generally speaking, pain of central origin and pain from deep structures are

sometimes relieved by peripheral blocks. It is, therefore, not surprising that three cases of zoster neuralgia have been put on record (27) as relieved by local anesthesia of the cutaneous scars. In our experience, however, even transient relief is only occasionally obtained by this method, and never a permanent cure. Excision of the involved skin has also been successful in a few instances (29).

In trigeminal (ophthalmic) zoster neuralgia, operations designed to denervate the painful areas, either by extensive local undercutting of the scalp or by trigeminal rhizotomy (as for tic douloureux) have mostly been abandoned as ineffective or even aggravating (17). Good results from repeated paravertebral and stellate-ganglion blocks with procaine have been claimed (18, 30–32, 34). Few of the favorable responses, however, were in cases of more than six weeks' duration. The good results reported with x-ray therapy were also in acute cases (33).

It is doubtful whether any of these methods can be advocated for the prevention of postherpetic neuralgia, or can be regarded as a hope for the chronic sufferer.

Bonica has been successful in the use of segmental intra-arachnoid alcohol injections but this method requires the most expert hands (18).

4. *Devices, other than common analgesics, specifically directed toward the central nervous system*, include interruption of the pain-conducting pathways, frontal lobotomy, and other psychosurgical procedures. Spinothalamic cordotomy seems to be the most effective surgical approach, especially in neuralgia affecting the lower limbs.

Sugar and Bucy (17) report the unsuccessful bilateral removal of the sensory cortical area for postherpetic pain in one side of the face, after equal failure of peripheral denervation. Lobotomy eventually "gave some surcease" in this patient. In general, lobotomy will be found too destructive of the patient's personality and should be reserved for the most desperate cases.

SEGMENTAL COUNTERIRRITATION—A NEW METHOD

Finally it may be of interest to report a personal method of segmental counterirritation. It has been of some help in a few cases treated in the Pain Clinic, University of California Medical School.

Following up our work on the segmental distribution of pain referred from muscle (35), it was found that a stimulus such as the injection of hypertonic saline into paravertebral muscle would not only produce a transitory pain of segmental distribution, but confer freedom from pre-existing pain in patients who consented to this therapeutic trial. The method was tried in cases of amputation, causalgia, tabetic and other intractable pains. The best results, however, were obtained in patients suffering from postherpetic neuralgia.

In 10 cases (Table 1), 1 cc. of sodium chloride in a 6 per cent aqueous solution was injected between the spinous processes corresponding to the level of the postherpetic lesion. The needle was directed slightly to the affected side and inserted so as to reach the deep paravertebral tissues. After injection a severe deep ache in the desired segmental distribution was experienced for about ten minutes.

This was followed by relief of the patient's neuralgia for periods varying from hours to years. The table lists the other procedures which were tried in these patients, before and after segmental counterirritation; those superior to the counterirritation method appear in italics.

Case Histories

Two brief case histories follow, to illustrate the average effect:

Case 1, Mrs. E. N., aged 77, was given interspinous saline injections for two years at variable intervals, most of them weekly, for typical postherpetic pain of two years' duration, in the left T12-L1 distribution. The average effect of each injection was twelve hours of complete freedom from pain. In the beginning, relief up to six days was obtained. This meant absence of her attacks of intolerable stabbing pain, which previously would last for hours and come on at intervals of a few minutes, not unlike tic douloureux. Codeine was given every three to four hours in ½-grain doses, but was not very effective unless the segmental saline injection was also given. An additional mild, tolerable, but fairly constant stinging sensation in the hip and groin was not influenced by the injections. Local procaine and Efocaine injections had either no effect, or less effect than saline.

Case 2, Mr. L. H., aged 63. In this patient, fairly successful segmental injections were followed by *local* injections of sodium chloride (6 per cent) into the most tender area of the left thigh (L2). He had not been benefited by a previous neurectomy of the anterior cutaneous nerve of the thigh, nor did he obtain relief from local and intravenous injections. The local saline injections, which were only moderately painful, for a week or two effectively replaced the multiple daily hypodermic injections of Demerol he had been administering to himself. Eventually this patient was cured by cordotomy.

COMMENT ON SEGMENTAL COUNTERIRRITATION

It is sometimes pointed out—but not as a rule by experts on postherpetic neuralgia—that, as in the case of other intractable pain, the pain of herpes zoster is largely a psychosomatic problem. Idle, frustrated, old people, it is said, understandably take refuge in a complaint of this sort. In our experience the sufferers have been mostly active, basically cheerful persons, some of them still working. They had none but this single complaint and were on the whole most appreciative of the afforded relief. Was this achieved on the basis of suggestion? The variable results obtained in the same psychologic setting, even in any one patient, seem to favor a physiologic mechanism which is but ill understood, namely, that of counterirritation.

The high concentration of the administered saline and the induced pain leave no doubt as to the irritant nature of the injections. In contrast to all the irritants so abundantly used throughout centuries of medical practice, the one under review is not applied to the skin but to deep tissue. It produces no observable anatomic tissue changes. The period of local irritation does not exceed a few minutes, nor does the referred pain last any longer. The use of an injection needle may recall the practice of acupuncture, but the difference is obvious.

Most other methods are based on the principle of analgesic block. To explain the effects of this contrasting procedure the hypothesis of "shock" is suggested. Shock, the electronics engineers tell us, is a means of restoring disturbed circuits with lasting effects; and shock to internuncial activity may be the principle

TABLE 1

Patient	Age & Sex	Duration of complaint	No. of interspinous inj. of NaCl 6 %	Duration of relief		Other procedures in Pain Clinic	Procedures elsewhere	Result at last follow-up	Duration of follow-up
				Max.	Min.				
C. B.	62 F	2 yrs.	4	Sev. dys.	30 min.	Amytal i.v.; Pontocaine i.v.; physiol. saline i.v.; phenobarbital	Codeine and aspirin	Improved; working	1½ yrs.
H. C.	60 M	4 mos.	3	2 hrs.	nil	Local Amytal, phenobarbital & Dilantin; Pontocaine i.v.	—	Attacks less frequent; work interrupted by heart attack	2 yrs.
A. F.	72 M	5 mos.	8	2 mos.	Sev. dys.	—	—	Unchanged; retired	2 yrs.
L. H.	63 M	5 yrs.	7*	7 hrs.	5 hrs.	Procaine i.v.; local procaine; narcotics	*Chordotomy*	Minimal complaints; no narcotics; retired	3½ yrs.
B. J.	69 F	4 yrs.	4	3 dys.	?	Etamon; Priscoline; phenobarbital	—	Moderate improvement; retired	3 mos.
E. J.	71 M	6 mos.	3	2½ yrs.	1 wk.	—	Stilbestrol for metastatic (pulmonary) Ca. of prostate	No further chest pain; retired	2½ yrs.

A. L.	75 M	7 mos.	1	Few hrs.	—	Vibration; B_{12}	—	Much improved; retired	3 mos.
E. N.	77 F	2 yrs.	35	6 dys.	6 hrs.	Efocaine	Local procaine	Slightly better with injections; retired	2 yrs.
E. H. P.	69 M	3 yrs.	3	24 hrs.	1 hr.	—	Local procaine	Unchanged; working	1½ yrs.
E. R.	65 M	4 yrs.	1	1 hr.	—	Ethyl chloride spray	Homeopathic remedies	Improved; retired	10 mos.
	Avge. Age: 68 M: 7 F: 3	*Avge. 2 yrs.*							*Avge. 1 yr. 8 mos.*

Relief by NaCl 6% (summary)

Duration	No. of patients
None	0
Minutes	0
Hours	5
Days	3
Months	2
Total	10

* Followed by innumerable local injections.

governing the restorative effect of counterirritation in general. The irritant saline injection is seen as a shock fed into the appropriate spinal segment. Its input is picked up by the corresponding small afferent endings situated in the paravertebral tissue or in the affected peripheral area (Case 2).

The very marked initial pain of the injection is not unduly resented by the severely tried sufferer and is often outweighed by the subsequent benefit. In view of the dearth of other effective remedies for one of the most distressing conditions known to man, the method is recommended for trial.

SUMMARY

An outline of our knowledge concerning herpes zoster has been sketched. An acute, usually self-limiting condition, it should be distinguished from its intractable chronic sequel, postherpetic neuralgia.

The more important remedies for this condition have been reviewed and their lack of efficacy discussed. Among the remedies, vitamin B_{12}, paravertebral sympathetic block, and cordotomy are relatively the most promising, with lobotomy as a last resort. Administration of cobra venom may be considered.

A method of segmental counterirritation is described whereby injection of small amounts of hypertonic saline into paravertebral muscle produced interesting and frequently favorable results. In our hands, in the small series of cases reported, this method was found to be entirely harmless and of apparent benefit. Although we realize that one must not draw conclusions from so small a series, nevertheless, the results were sufficiently encouraging to suggest that others may be interested in further studies to evaluate the method described.

REFERENCES

1. Edgerton, A. E.: Herpes zoster ophthalmicus, *Arch. Ophth.* **34:** 40, 114, 1945.
2. Kundratitz, K.: Experimentelle Übertragung von Herpes zoster, *Wien med. Wchnschr.* **77:** 771, 1927.
3. Lipschütz, B.: Untersuchungen über die Ätiologie der Krankheiten der Herpes-gruppe (Herpes zoster, Herpes genitalis, Herpes febrilis), *Arch. f. Dermat. u. Syph.* **136:** 428, 1921.
4. Baird, P. C., Jr.: Herpes zoster, *New England J. Med.* **225:** 568, 1943.
5. Brain, W. R.: A lecture on zoster, varicella and encephalitis, *Brit. M. J.* **1:** 81, 1931.
6. Stern, E.: The mechanism of herpes zoster and its relation to chickenpox, *Brit. J. Dermat.* **49:** 263, 1937.
7. Head, H., and Campbell, A. W.: Pathology of herpes zoster, *Brain* **23:** 353, 1900.
8. Orthner, H.: Zur pathologischen Anatomie des Herpes zoster, *Deutsche Ztschr. f. Nervenh.* **160:** 251, 1949.
9. Lhermitte, J., and Nicholas, M.: Les lésions spinales du zona, La myélite-zostérienne, *Rev. neurol.* **41:** 361, 1924.
10. Schiff, C. I., and Brain, W. R.: Acute meningo-encephalitis associated with herpes zoster; a fatal case, *Lancet* **2:** 70, 1930.
11. Whitty, C. W. N., and Cooke, A. M.: Some unusual complications of herpes zoster, *J. Neurol. Neurosurg. & Psychiat.* **12:** 152, 1949.
12. Taterka, J. A., and O'Sullivan, M. E.: The motor complications of herpes zoster, *J. A. M. A.* **122:** 737, 1943.
13. Worster-Drought, C., and McMenemey, W. H.: Paresis of upper motor neurone type following herpes zoster, *J. Neurol. & Psychopath.* **14:** 52, 1933.

14. Goodpasture, E., and Anderson, K.: Infection of human skin, grafted on the chorio-allantois of chick embryos with the virus of herpes zoster, *Am. J. Path.* **20:** 547, 1944.
15. Bruusgaard, E.: The mutual relation between zoster and varicella, *Brit. J. Dermat.* **44:** 1, 1932.
16. Ambler, J. V.: Bilateral herpes zoster, *Arch. Dermat. & Syph.* **39:** 706, 1939.
17. Sugar, O., and Bucy, P. C.: Postherpetic trigeminal neuralgia, *Arch. Neurol. & Psychiat.* **65:** 131, 1951.
18. Bonica, J. J.: The Management of Pain. Philadelphia, Lea & Febiger, 1953, p. 861.
19. Lillie, W. I.: The treatment of herpes zoster ophthalmicus with smallpox vaccine, *New York State J. Med.* **43:** 857, 1943.
20. Somers, M. R., and Pouppirt, P. S.: Herpes zoster—some of its clinical aspects, *California & West. Med.* **42:** 370, 1935.
21. Taren, J. A.: A clinical evaluation of cobra venom extracts for control of pain, *Univ. Mich. M. Bull.* **19:** 206, 1953.
22. Hills, R. C., and Firor, W. M.: Use of more potent cobra venom for intractable pain, *Am. Surgeon* **18:** 875, 1952.
23. Marsh, W. C.: Treatment of herpes zoster with protamide, *U. S. Armed Forces M. J.* **1:** 1045, 1950.
24. Leitch, G. B.: Vitamin B12 in massive dosages for herpetic lesions, *Northwest Med.* **52:** 291, 1953.
25. Rattner, H., and Roll, H. C.: Herpes zoster and vitamin B_1, *J. A. M. A.* **112:** 2585, 1939.
26. Wallerstein, R.: Tetraethylammonium chloride in post-herpetic neuralgia, *California Med.* **71:** 421, 1949.
27. Hollander, E.: Dependence of sensation of pain on cutaneous impulses, *Arch. Neurol. & Psychiat.* **40:** 743, 1938.
28. Secunda, L.; Wolff, W., and Price, J. C.: Herpes zoster: local anesthesia in treatment of pain, *New England J. Med.* **224:** 501, 1941.
29. Browder, J., and DeVeer, J. A.: Herpes zoster: a surgical procedure for the treatment of postherpetic neuralgia, *Ann. Surg.* **130:** 622, 1949.
30. Findley, T., and Patzer, R.: The treatment of herpes zoster by paravertebral procaine block, *J. A. M. A.* **128:** 1217, 1945.
31. Hyndman, O. R.: Postherpetic neuralgia, *Arch. Neurol. & Psychiat.* **42:** 224, 1930.
32. Rosenak, S.: Procaine injections in treatment of herpes zoster, *Lancet* **2:** 1056, 1938.
33. Reeves, R. J., and Waters, L. B.: Herpes zoster, *Texas State J. Med.* **42:** 490, 1946.
34. Schmitt, W.: Zur Behandlung der Schmerzzustände nach Herpes zoster, *Deutsche med. Wchnschr.* **75:** 1033, 1950.
35. Feinstein, B.; Luce, J. C., and Langton, J. N. K.: Human Limbs and Their Substitutes. New York, McGraw-Hill, (in press).

A NEW BOON TO THE AGED—RELIEF OF NOCTURNAL LEG CRAMPS

W. H. LANE, JR., M.D.*

Dover, Arkansas

Orthoxine hydrochloride[1] is a very useful bronchodilator substance. It has been helpful in bronchial asthma, allergic rhinitis, acute urticaria, and various other allergic manifestations. This synthetic amine inhibits smooth muscle, but does not have the pressor and central nervous system stimulating properties of other chemically similar compounds. The purpose of this paper is to introduce for this drug an entirely new use, the importance of which may even supersede its other therapeutic applications.

In practice, Orthoxine has frequently been noted to cause a flushing or blushing reaction, particularly in children. This may be so striking that the parents become alarmed, thinking the rubor a sign of a rapidly mounting fever. Many anxious telephone calls have been averted by giving warning of the possibility of such a reaction when giving prescriptions containing Orthoxine, and reassuring those concerned that the flushing is temporary and is a part of the beneficial action of the medication. It is with this side reaction that we are concerned in this report.

NOCTURNAL LEG CRAMPS

With the mounting proportion of geriatric patients in every general practice, nocturnal leg cramping is a frequent complaint. Variously described as "bone ache," "burning pains," "rest pains," or "cramps," the condition occurs with increasing frequency in patients over 50 years of age. Only occasionally is this the presenting complaint; usually there is concomitant disease producing other symptoms. The cramps occur after an hour or more of sleep, awakening the patient and disturbing his rest. They are relieved by getting up and walking about and rubbing the thigh and calf muscles. Often the patient is thus disturbed several times in a night.

The cause is apparently sclerosis and partial occlusion of some of the arterioles, with or without generalized arteriosclerosis. When the patient relaxes and sleeps, the physiologic fall of blood pressure deprives some areas of adequate circulation. Walking or mild exercise stimulates the flow of blood through the ischemic parts and promptly relieves the pain. Anterior and posterior tibial pulses may or may not be palpable. Signs of arteriosclerosis are almost always evident somewhere in the body. Typically, the patient is in his late sixties, has sparse grey hair, thin dry skin, cold feet, brittle ridged nails, palpable pipestem arteries, an elevated blood pressure, slight enlargement of the heart and aortic bulb, suboptimal

* Member of Staff, St. Mary's Hospital, Russellville; and Vice-chief of Staff, Clarksville Hospital, Clarksville, Arkansas.

[1] Trade name for beta-(ortho-methoxyphenyl)-isopropyl-methylamine hydrochloride, The Upjohn Co., Kalamazoo, Michigan.

nutrition, and degenerative lesions of the eyes, brain, kidneys or liver. Cold weather, abrupt change in weather, dampness, and exposure are apt to aggravate the condition. The onset of warm weather is often associated with temporary remission of the cramps. These are the people who have vascular complications. They are predisposed to thromboses, whether coronary, cerebral, renal, mesenteric or peripheral. The thrombus often forms during the slowing of circulation following fatigue, undue exertion, exposure, or even psychic stress. The nocturnal cramps may be regarded as a physiologic warning and a protective device against more severe vascular accidents.

TREATMENT

Various remedies have resulted in some alleviation of pains, but most are not effective for long, cause frequent unpleasant side reactions, and are not easily tolerated by the aged. Various sedatives, alcohol, vasodilators, quinine, iodine preparations, salicylates, turpentine, and many other preparations have been used with little consistent result.

Orthoxine hydrochloride has a very low incidence of side reactions, and completely and dependably prevents the occurrence of nocturnal leg cramps in the elderly patient. For the past three years I have used it in 200 patients ranging in age from 55 to 87 years. All had previously tried various remedies without benefit. Most of these patients were concomitantly under treatment for other diseases peculiar to the group, such as congestive heart disease, pellagra, cerebral arteriosclerosis, prostatism, carcinoma, varicose ulcer, dermatitis, hypertension, coronary thrombosis, cholecystitis, or cholelithiasis. The results were as follows:

1. During medication with Orthoxine (100 mg. at bedtime) 196 patients experienced complete relief of nocturnal leg cramps.
2. Three patients required an occasional additional dose of 100 mg. after four to six hours, to prevent recurrence of cramps.
3. One patient experienced excitation and restlessness following administration of the usual dose, but responded without undue stimulation of psychomotor areas when the dose was decreased to 50 mg.
4. At no time was incompatibility with other medications noted. The patients continued their various treatments and felt better because their rest was undisturbed. Many believed the Orthoxine to be "sleeping medicine," as it effectively enabled them to rest, though no sedative was given.
5. Most of the patients were able to get along during warm weather without medication, but promptly resumed treatment when cool weather started.

There were no vascular complications in this group when Orthoxine was taken in the manner described. Although statistics have not been collected, an overall study leaves the impression that Orthoxine has a protective value against cerebral and coronary thromboses. Several of the patients in this series discontinued therapy and subsequently suffered from strokes. Occasionally patients feel so much better while receiving treatment that they stop it, not realizing that their pathologic circulatory condition remains essentially unchanged, though functionally improved.

SUMMARY

The use of Orthoxine hydrochloride in the prevention of nocturnal leg cramps due to arteriosclerosis has been effective in 200 patients, with only one incident of psychomotor intolerance to the drug. It is suggested that Orthoxine may offer some protection against the formation of thrombi by improving arteriolar circulation.

CRITERIA FOR THE FEASIBILITY OF REHABILITATION IN THE GERIATRIC PATIENT*

EDWARD J. LORENZE, M.D.†

The Burke Foundation, White Plains, N. Y.

It has been stated that "the goal of rehabilitation is to achieve the maximal function and adjustment of the individual and to prepare him physically, mentally, socially, and vocationally for the fullest possible life compatible with his abilities and disabilities." (1).

In its broadest implications this is an expression of one of the basic concepts of medical practice and as such applies to all types of illness. The principles are not limited to any particular disease process, therapeutic technique or age group. In association with the concepts of prevention, diagnosis and specific treatment, it rounds out our thinking in regard to what constitutes the role, the responsibility and the function of physicians. These "four phases" of medicine, based on continued research and education, cover the essence of medical practice and provide a sound intellectual framework for the individual physician in developing his own approach to his profession. It is only by the incorporation of each of these concepts into his personal approach, that the individual physician can fulfill his responsibility in providing comprehensive medical care.

This paper, however, will be limited to a discussion of the specific rehabilitation of geriatric cases, and will be concerned with the more common neuromuscular and skeletal disorders which are amenable to treatment by physical medicine and by training in the activities of daily living through rehabilitation techniques.

We shall first deal with the general evaluation of patients who are being considered for rehabilitation. Secondly, we shall discuss some aspects of particular disabilities which are commonly seen.

EVALUATION

Initial evaluation is the prime factor in the successful rehabilitation of any patient; on the basis of the findings, goals can be set which are realistic and attainable in the light of past experience. This appraisal includes the physical social, psychologic and vocational factors. It is at times difficult to make predictions for all the variables, but we can make preliminary plans for several possible results and, as the situation clarifies, concentrate on the plan which is most suitable. Arrangements for the post-rehabilitation period, and vocational planning both rest on the ultimate physical and psychologic picture and the social circumstances.

* Presented at the Annual Meeting of the American Geriatrics Society, San Francisco, California, June 17–19, 1954.

† Medical Director, The Burke Foundation; Assistant Professor of Clinical Medicine, Cornell Medical School.

In predicting the future functional status of the individual one must be able tentatively to answer such questions as:

a) Will the patient be able to walk and climb stairs? will he need such aids as braces or crutches?

b) If not, will he be self-sufficient in a wheel-chair, *i. e.*, get from bed to wheel-chair, to toilet, or bath?

c) Will he be able to take care of feeding, dressing and toilet activities?

d) If he is able to do these things, will he be able to live alone as previously? Can he prepare meals, or get out to a restaurant?

e) Will the family be able to take care of the patient at home as previously or will an institution, such as a boarding home, nursing home or chronic disease hospital be necessary?

f) Will the patient be able to return to his original occupation, or to another job compatible with his residual limitations?

The following criteria for the feasibility of rehabilitation are the points which must be investigated in the initial evaluation.

Psychologic status

Intellectual capacity will affect the degree of cooperation which can be obtained; disorientation, difficulty in concentration, excessive loquaciousness, preoccupation with certain ideas, and emotional lability will present difficulties. It is important to note that little or no progress in physical rehabilitation can be made unless the patient actively participates. Unless he contracts his muscles, no one can do it for him. Rehabilitation cannot be forced upon him. In terms of new techniques, it is an educational program and the patient must have sufficient intellectual capacity to observe and retain the training.

Besides the intellectual capacity, the patient must also have the emotional capacity to attempt rehabilitation. Motivation must be present to achieve improvement. This may be lacking for a variety of reasons, including nonacceptance of the disability, neurotic secondary gains from the disability itself, and reactive depression in the face of the realistic problems which the disability presents (2). The emotional reaction of the patient will be dependent upon the premorbid personality structure, and the mechanisms by which he has dealt with conflicts in the past. It is for this reason that a picture of the patient's personality is an essential ingredient of the initial rehabilitation evaluation.

Social status

Closely related is a determination of the social setting of the patient. What have been his needs in the past in terms of living arrangements, associates, finances and sources of pleasure? How have these needs been met in the past? How does the present disability alter the situation? How will the needs be met when the patient has been rehabilitated to his potential maximum? What is the outlook of relatives and friends? As part of the initial evaluation, we must determine as best we can the answers to these questions.

Physical status

There are many physical factors which play a part in the rehabilitation evaluation. Like the psychologic, social and vocational factors, they are important considerations in all age groups but are more frequently present in active form in the geriatric situation.

1. *Cardiac status:* Physical rehabilitation in neuromuscular skeletal disability implies the use of therapeutic exercise (including the progressive resistive type) as well as functional activity, such as walking with or without apparatus, climbing stairs, bathing, dressing, attending to toilet necessities, and feeding. In order to accomplish these minimal activities of daily living, cardiac function must be such as to permit it. The criteria for dealing with any cardiac patient are used in determining the functional capacity and therapeutic classification for the rehabilitation patient. If one would expect a cardiac patient without neuromuscular skeletal disability to walk and to perform the foregoing activities, then the hemiplegic or the amputee with a similar cardiac status would be expected to do the same. As we all know, it is difficult to classify cardiacs on the basis of physical findings alone; actually, we classify them on the basis of their course during activity. If excessive fatigue, palpitation, dyspnea or angina occur as a result of a particular activity, we then restrict it. Similarly, in rehabilitation, a hemiplegic patient with heart disease will be started on the therapeutic rehabilitation regimen, but if cardiac symptoms or signs of congestive failure develop, the activity will be decreased to the level of the individual's tolerance. In geriatric patients, as with others, it is essential that the cardiac status be determined as part of the evaluation. On the other hand, the fact that a patient is taking digitalis is no reason for withholding a therapeutic trial of rehabilitation. These patients must be followed carefully during graduated physical activity, to determine whether the cardiac function will permit the objectives of treatment.

2. *Peripheral vascular status:* Similar precautions must be taken concerning patients who have arterial or venous insufficiency due to peripheral vascular disease, with the complications. One of the commonest problems is edema of the feet and ankles, most commonly due to a combination of dependency, immobilization, inactivity of the leg muscles, pain, and relative venous insufficiency. This usually improves with elevation, elastic bandages, and resumption of muscular contractions. If standing and ambulation are pushed excessively before the local picture is improved, persistent edema, pain and even ulceration may result. In the initial evaluation, the peripheral arterial and venous circulation should be examined carefully for insufficiency and thrombophlebitis.

3. *Neurologic status:* This is obviously important in cases with primary neurologic disabilities but is frequently overlooked in cases in which the primary disability lies in the musculo-skeletal system. Older patients with fractures, arthritis or amputation frequently show more than the usual difficulty in mastering ambulation with or without assistive devices such as crutches, canes, braces or prostheses. The difficulty is often due to an unsuspected neurologic condition which is not grossly evident on casual observation. Such conditions are usually related to underlying vascular disease, and give rise to minimal hemiparesis

causing (a) incoordination of movements as a result of spasticity, (b) ataxia due to involvement of the cerebellar system, (c) peripheral neuropathies resulting in loss of position sense, (d) visual-field defects which prevent the patient from seeing obstacles in his path, and (e) tremor and rigidity of early disease of the basal ganglia. It is to be emphasized that we are talking about mild disturbances which might not be suspected at first and which can be elicited only by careful neurologic examination. Such examination is an essential part of evaluation of the patient for rehabilitation.

Bowel and bladder function must also be considered. If symptoms are present, it is necessary to establish whether they are due to underlying neurologic disease, primary disease of the gastro-intestinal or genito-urinary tract, or to a temporary condition secondary to the acute illness, surgery, or inactivity caused by the disability. The prognosis regarding future function is important, as bowel or bladder symptoms are extremely distressing for many patients.

4. *Musculo-skeletal status:* Probably the most frequently mentioned part of the rehabilitation evaluation involves the muscle test, the articular range-of-motion test and the test of activities of daily living. In effect, these procedures test the functional ability of the patient to do the 100 or more basic activities of self-care. They are dependent upon an intact neuromuscular skeletal system. It is obvious that a breakdown anywhere in this system may result in a disability, regardless of the normal status of the rest of the system. For example, if there is limitation of range of motion in a joint due to intra-articular pathology, despite the fact that the muscles and their innervation are normal, disability may be present. There may also be disability when the joint is normal but the muscles are weak from disuse; or when joints and muscles are normal but neurologic function is deranged. Therefore, tests of articular range-of-motion and muscle power are used to determine what activities of daily living are possible, or explain why such activities cannot be performed. The tests point out certain observable phenomena, but it is up to the physician to determine the underlying cause and to prescribe measures to correct them if possible. In addition, one must look for the presence of other skeletal deformities and such things as inequality of leg lengths; if pain syndromes occur, the cause must be determined.

CONDITIONS AFFECTING AMBULATION

We have discussed certain of the general criteria which apply to all cases, but there are some points regarding specific conditions from the point of view of ambulation.

Hemiplegia: The ordinary hemiplegic should be able to walk without assistance. The usual picture at the ankle is incomplete dorsiflexion of the foot, spasticity of the gastrocnemius, eversion weaker than inversion, and possibly clonus. Regardless of these findings, the situation can be adequately handled with a short-leg brace to permit ambulation. The presence of active dorsiflexion and eversion of the foot would indicate that a brace is probably unnecessary, although observation of the gait pattern itself is the final determinant. If the patient walks with an equino-varus foot pattern, a brace may be needed to give ankle stability.

Foot drop is a problem primarily when hip and knee flexion are weak, because the patient will have difficulty clearing the floor in the swing phase of ambulation when the leg is being advanced. This frequently leads to the pattern of circumduction of the leg, which is an ungainly way of clearing the foot from the floor.

Stability at the knee is the next point; this depends upon the relationship of the quadriceps and hamstrings. A *fair* quadriceps is not essential to maintain the knee in extension in the weight-bearing position, as long as the flexion forces are not stronger. If, however, hamstring spasticity is marked, it will cause the knee to buckle when the quadriceps is weak. On the other hand, active flexors of the knee are needed to raise the lower leg from the floor in the swing phase. If not present, or prevented from acting because of quadriceps spasticity, the leg will have difficulty in advancing because of inability to clear the floor. Thus the balance between the two groups is the important factor. Marked spasticity or weakness of one or both muscles presents an obstacle to ambulation.

Hip movements also are determined by the interaction of opposing groups. Functional weakness of a movement may be due to paresis of the muscle itself or spasticity of the opposing muscle as a result of the stretch reflex set up by the initiation of the desired movement, or by a disturbance of the neuromuscular mechanism of reciprocal innervation. In order to advance the paretic limb, some hip flexion should be present. Frequently the sartorius is active, causing external rotation as well as flexion, but this is an undesirable gait pattern. For correction, the internal rotators and other hip flexors must be brought into the movement. The rectus femoris is not helpful as a hip flexor, because there is associated knee extension which interferes with clearance of the leg. Spasticity of the gluteus maximus contributes to the difficulty by blocking the action of the hip flexors. Similarly, if spasticity of the hip flexors is too great, there is difficulty placing the leg securely on the floor. Spasticity of the adductors is frequently present, with weakness of the gluteus medius. This may cause cross adduction of the extremity, which prevents advancement of the normal leg, or may lead to a gluteus medius type of limp.

In evaluating the motor function of the lower extremity in terms of ambulation, one must bear in mind the functional needs. It should be realized that spasticity and imbalance between groups are the most important factors, and that what occurs at one joint will affect all the others. Function will vary in different positions and an inactive muscle in the supine position may become active in the erect position. This is particularly true when actual function-like walking is attempted. An attempt to walk will bring out more activity than can be elicited in individual muscle testing. Free passive range of motion must also be present in order to permit the muscle to perform this function. The most frequently observed contractures are those at the heel cord and hamstrings, which prevent placement of the foot on the ground, and limit weight-bearing stability at the knee, where the anatomic locking mechanism cannot function except in the extended position.

Fracture of the hip: The aims of rehabilitation following definitive treatment for fracture of the hip, whether that treatment be traction, pinning, or the use

of replacement prostheses (such as Judet's), are the following: (a) maintain range of motion and muscle power in both involved and uninvolved joints of the same extremity, and also in the uninvolved extremity; (b) maintain the general strength and spirit of the patient during the period of non-weight bearing; (c) train the patient to be self sufficient and active during this period; and (d) achieve progressive ambulation. Such patients at first can be self sufficient in a wheel-chair and can bear weight on the good leg. The next step is ambulation in the parallel bars without weight bearing, and then crutch walking without weight bearing. At this juncture the patient can be discharged home, and can be self sufficient until healing progresses to the point where weight bearing may be permitted, at which time crutches are given up for a cane; this, in turn, may be dispensed with, when balance is satisfactory. The aim of interim management is to prevent deterioration due to these complications during the healing period, so that the patient will be able to walk when healing has been acieved. In evaluating the patient, careful note should be made of flexion contractures at the knees and hips, weakness of the quadriceps and other muscles of the uninvolved leg, and loss of sufficient range of motion in the hip to achieve the anatomic positions necessary for standing and sitting. Shortening of the involved extremity may produce a limp if not corrected by a shoe lift. Concomitant involvement of other systems, including neurologic disorders, must be ruled out.

Arthritis of the lower extremities: These remarks are made with reference to ambulation in the elderly patient with arthritis of the hip or knees. They apply to osteoarthritis, rheumatoid arthritis, and the mixed type.

It is axiomatic that the painful joint should be kept at rest and that weight bearing should be avoided or minimized. If both legs are involved the patient will be in bed or a wheel-chair. However, therapeutic exercise within the patient's ability to maintain range of motion and motor power must be continued, so that when the process becomes quiescent, secondary changes and deformities do not prevent ambulation. Except in very severe cases, such patients can be self sufficient in a wheel chair. If only one limb is involved, the patient can be ambulatory on crutches without, or with minimal, weight bearing.

On evaluation, one must check to see that the essential passive range of motion is present for assuming the erect position. If this is not present, success will depend on ability to achieve correction of the deformity. Basically, sufficient dorsiflexion of the ankle must be present for placement of the foot flat on the floor without compensatory flexion at the knees and hips; complete extension of the knees must be possible for assuming the erect posture; otherwise the body will be solely supported by the quadriceps, which soon tire under this unusual strain and preclude satisfactory ambulation. The most frequent finding is flexion contracture of the knee, due either to local pathology, or to secondary compensation for flexion contractures of the hip or ankle. Full extension of the hip and knee for standing, and close to 90° hip and knee flexion for sitting, are necessary for comfort. Correct body alignment is essential for the erect position and ambulation. Pain is frequently aggravated by strain on muscles and ligaments working in abnormal positions. In conjunction with the general considera-

tions, the ability to achieve range of motion in the joint, and satisfactory muscle strength, will decide the possibility of ambulation. Deformities due to intra-articular pathology, contracture of the joint capsule or contracture of muscles may occur during forced inactivity and prolonged immobilization in one position, either in bed or in a wheel-chair.

SUMMARY

The conditions discussed stress essentially the same physical factors for all types of neuromuscular skeletal disabilities. The criteria for rehabilitation in these cases involve an evaluation of the functional status of the neuromuscular skeletal system. Certain deformities, muscle weaknesses and neurologic findings are incompatible with particular activities of daily living. If such conditions are found, then rehabilitation in terms of these particular activities is not feasible, unless the condition can be improved through treatment. The complete physical and psychologic status of the patient must be considered in determining the prognosis.

REFERENCES

1. Baruch Committee on Physical Medicine: Report on a Community Rehabilitation Service and Center. Compiled by Ray Lyman Wilbur, Chairman; Frank H. Krusen, Director; and the Subcommittee on Civilian Rehabilitation Centers, for Bernard M. Baruch, 597 Madison Ave., New York, N. Y.
2. Garrett, James F., and Myers, Julian S.: Motivation and rehabilitation, *Occup. Therapy* **30:** 296 (Oct.) 1951.

DIAGNOSIS AND TREATMENT OF DISEASES OF THE BLADDER IN THE AGED*

NORRIS J. HECKEL, M.D.†

The Department of Urology, Presbyterian Hospital, and the University of Illinois, College of Medicine, Chicago, Illinois

CYSTITIS

The most common disease of the bladder in the aged is so-called cystitis. Cystitis should not, however, be considered as a complete diagnosis, except in occasional instances.

A fundamental consideration is that recurrent or chronic cystitis is usually associated with some pathologic process in the genito-urinary tract or adjacent organs. This is especially true in elderly people. Thus it will do little good to treat a patient for cystitis when the primary cause is an enlarged prostate gland, bladder stone, diverticulum, cystocele, or some disease in the upper urinary system. Of great importance is the fact that many diseases of the upper urinary tract manifest themselves by producing the symptoms of cystitis.

Etiology: The three common routes of invasion of the bladder are 1) from the blood, 2) from the upper urinary system, and 3) from the urethra. Other factors such as injury, retention of urine, or pathologic lesions anywhere along the urinary system, are contributing factors.

Pathology: In the acute form the bladder mucosa is swollen, edematous and red. Through the cystoscope may be seen flakes of pus adhering to the mucosa. In the acute hemorrhagic type the entire bladder mucosa is studded with circumscribed submucous hemorrhages that may vary in size from 1 millimeter to 1 centimeter in diameter.

In chronic cystitis the picture is different. The mucosa becomes pale and slate-colored and in various areas of the bladder wall may be seen the pinhead sized translucent cysts of "cystitis-cystica." In long-standing inflammations a pericystitis may develop.

Symptoms: Dysuria, pyuria and frequency of urination are the three common symptoms of acute cystitis. Hematuria, and smarting and burning upon urination are common complaints. The pain may be constant or spasmodic. Nausea, vomiting, chills, fever and exhaustion are usually caused by an associated acute pyelonephritis or acute prostatitis.

Diagnosis: The diagnosis of acute cystitis is easily made from the history, physical examination and a study of the urine. In the acute condition cystoscopic examination should not be made, except in rare instances.

In chronic cystitis a complete study of the urinary tract is necessary. This should include cystoscopic and urethroscopic examination, pyelograms and

* Presented at the Annual Meeting of the American Geriatrics Society, San Francisco, California, June 17–19, 1954.

† President, American Geriatrics Society, 1954–55.

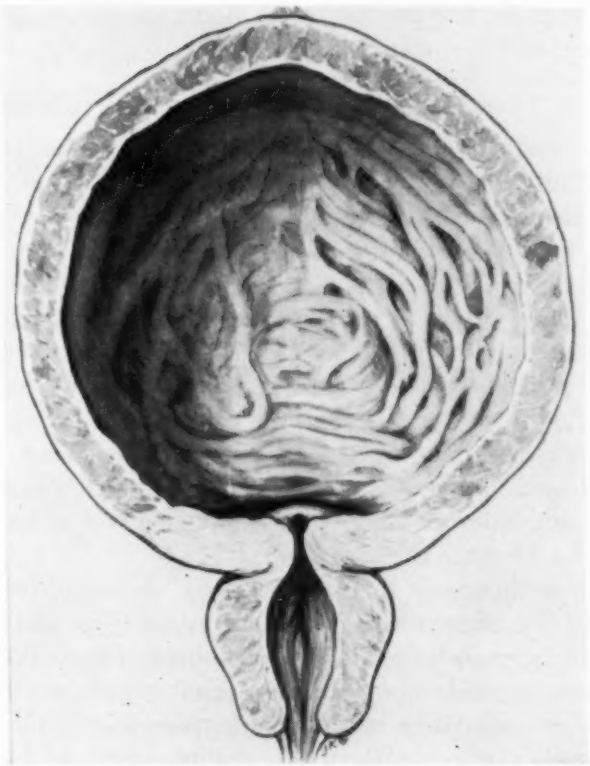


FIG. 1. Cystitis associated with trabeculations of the bladder secondary to a contracted bladder neck.

cultures of the urine. In most patients some contributing disease will be uncovered that is directly responsible for the cystitis (Fig. 1).

Treatment: In acute inflammations of the bladder the passage of instruments should be avoided unless absolutely necessary. If the cystitis is associated with retention of urine, a Foley indwelling urethral catheter may be used. When the symptoms are severe, complete bed rest and adequate fluid intake with alkalization of the urine is necessary. Stained smears of the urine are made and while cultures and specificity tests are being carried out, antibiotics may be given. It is well to remember that over 50 percent of bladder infections are caused by the colon group of bacilli. Therefore an antibiotic that is specific for this type of organism should be used. For the relief of bladder spasms, belladonna and opium suppositories (½ grain of each) may be inserted into the rectum every four hours.

The treatment of chronic or recurrent cystitis presents a different picture. In the vast majority of instances some associated pathologic lesion is the etiologic factor. In men, an enlarged prostate, a bladder diverticulum, or a bladder stone or tumor are frequent causes. In women, a cystocele or urethral diverticulum may be present. In both sexes, diseases of the upper urinary tract such as a calculus, hydronephrosis, renal tuberculosis or pyelonephritis may be a factor. It

is not uncommon, especially in women, to find a diverticulitis of the colon as the primary cause of a recurrent cystitis.

ELUSIVE ULCER: INTERSTITIAL CYSTITIS

Hunner's ulcer and localized submucosal cystitis are also terms used in describing this definite clinical entity. The disease occurs most frequently in women past middle age; men are rarely afflicted. Although the cause is unknown, the condition is characterized by a small hyperemic area, usually solitary, and usually localized in the dome of the bladder. When the bladder is distended the hyperemic area appears to open up and bleed. The histopathologic changes are in the submucosa, and consist chiefly of an infiltration of polymorphonuclear lymphocytes and plasma cells. Some of the blood vessels are sclerosed, but others appear to be dilated.

Symptoms: The two common symptoms of an elusive ulcer are frequency of urination and extreme urgency. The disease is progressive and, as the bladder becomes smaller, incontinence and extreme frequency of urination develop. As a result the patient becomes house-ridden.

Diagnosis: In most instances the diagnosis may be made from the history and an examination of the urine, which is usually crystal clear and normal. Because of this fact the physician usually thinks the trouble is outside the urinary system. The final diagnosis depends upon the results of cystoscopic examination. Because of the extreme sensitivity of the bladder, this should be performed under a general anesthetic, preferably Pentothal sodium unless it is contra-indicated. The lesion seen through the cystoscope has just been described.

Treatment: Of the many procedures that have been advocated for the treatment of elusive ulcer, fulguration of the ulcer with the Bugbee electrode through the cystoscope is superior to other forms of therapy. However, the percentage of cures from this type of treatment, or any other, is extremely low. Usually the fulguration has to be repeated within two to six months.

TUMORS

Neoplasms of the bladder are not uncommon in the elderly (Fig. 2). Bladder tumors are more likely to develop in aniline dye workers than in others; recently the urine has been considered to contain a carcinogenic substance. In dogs, tumors of the bladder have been easily produced by the oral administration of beta-naphthamine.

There are still differences of opinion about the classification of bladder tumors. A long dissertation on the etiology and classification of bladder tumors is of no value, as little new has been added in the last decade. However, about 90 per cent are either papillary epitheliomas or carcinomas. The important fact from a clinical standpoint is that all bladder tumors should be treated as malignant or potentially malignant.

Recurrences are common and follow-up examinations are essential.

Symptoms: The important symptom is hematuria, which is usually painless unless cystitis develops; then frequency, urgency and dysuria usually occur.

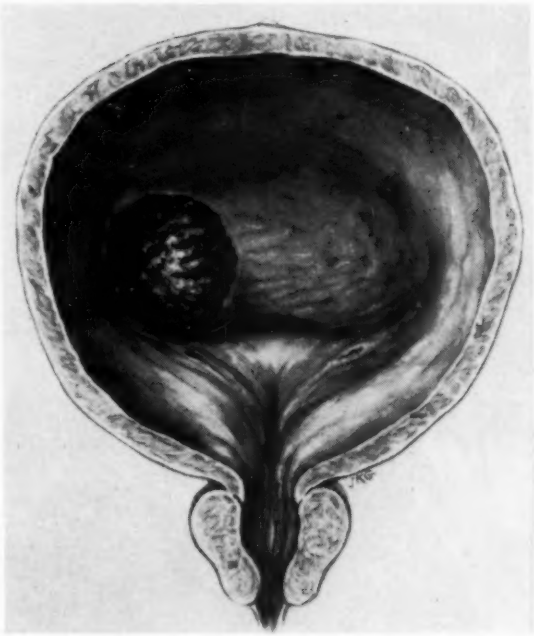


FIG. 2. A pedunculated papillary tumor on the right lateral wall of the bladder.

Diagnosis: The final diagnosis must depend upon the results of cystoscopic examination. In most instances a trained cystoscopist will have a fairly clear conception of the type of tumor encountered and the treatment necessary. In cases of doubt a biopsy can be easily performed.

Treatment: The treatment depends upon the size, location and character of the tumor. Tumors that are relatively small, pedunculated, and located on the base of the bladder in the region of the trigone can be adequately treated by fulguration or resection through the resectoscope. Large pedunculated or infiltrating tumors which are located on the dome or upper posterior wall can be removed by segmental resection of the bladder. At the present time there is no unanimity of opinion on the treatment of bladder cancers, in view of the fact that the bladder can not be resected. Radium, x-ray therapy, and total cystectomy with transplantation of the ureters, all have their adherents. However, in elderly people it is questionable whether extremely radical operations are within the realm of good judgment. Many of these people succumb.

DIVERTICULA

This condition is characterized by a protrusion or herniation of the bladder mucosa through the wall (Fig. 3). There are two types, congenital and acquired. In the congenital group a defect in the development of the bladder wall is present. In the acquired type the protrusion is caused by a back pressure from an obstruction at, or around, the bladder neck. Diverticula have been made experimentally in dogs by producing an obstruction at the bladder neck and traumatizing the bladder wall.

FIG. 3. Large bladder diverticulum secondary to obstruction at the bladder neck.

Symptoms and diagnosis: A diverticulum in itself does not produce symptoms. It is only when there is an infection (and there usually is) that the symptoms of cystitis are present. In most instances, especially in men, there is some type of obstruction at the bladder neck. Diverticula vary in size from a small cellule up to twice the size of the bladder. Occasionally a stone or tumor may develop in the diverticulum. Because obstruction at the bladder neck plays a role in their development they are more common in the so-called prostatic age. Most of them are found on the base of the bladder around the region of the trigone and, because of this, operative difficulties can occur. The diagnosis is made by cystogram and cystoscopic examination, in which the opening of the diverticulum is seen. However, size can be estimated only by means of the cystogram.

Treatment: When the diverticulum is small or even medium sized, its removal may not be necessary if the obstruction at the bladder neck is corrected. Following the removal of the obstruction, the diverticulum will usually diminish in size. Large diverticula usually require a diverticulectomy.

CALCULI

In the United States, bladder calculus is a disease of the adult (Fig. 4). It is usually found in elderly men, and is uncommon in women.

Etiology: The calculus may develop in the kidney, pass into the bladder, remain, and increase in size. More frequently a bladder calculus is secondary to prostatism, a neurogenic bladder, or a bladder diverticulum.

FIG. 4. Large bladder calculus. Such calculi must be removed through a suprapubic incision.

Symptoms: Sudden stoppage of urine during the act of micturition is the classic symptom of bladder stone. If there is an obstruction at the bladder neck (and there usually is), the signs and symptoms of prostatism are present, namely frequency, dysuria, hesitation, small stream, and pyuria.

Diagnosis: In contrast to kidney calculi, many bladder stones can not be seen on a plain x-ray picture. Therefore a cystoscopic examination is necessary in order to make the diagnosis. The structure and composition of bladder stones is variable, as is also their size, shape and color. The majority are made up of a mixture of crystals of the various urinary salts.

Treatment: The important thing in the treatment of patients with bladder calculus is the recognition and correction of the pathologic condition that is responsible for the development of the stone. For instance, it will do little good to remove the stone and not correct the obstruction at the bladder neck. Large bladder stones can best be removed by cystotomy. Smaller ones can be crushed with a lithotrite and the particles removed through a resectoscope sheath by a Bigelow pump.

FISTULAE

In the aged this is not a rare condition. The most common types are vesico-cutaneous, vesico-vaginal and vesico-enteric.

Etiology: Many fistulae of the bladder occur following operations. In men, the

most common cause is failure of the suprapubic incision to close following a prostatectomy. In women, the most common cause of vesico-vaginal fistula is a hysterectomy. Vesico-enteric fistulae develop as the result of the rupture of a diverticulum of the colon into the bladder.

Symptoms: These vary according to the type of fistula. In the vesico-enteric type, gas and bowel contents are passed in the urine. Thus, infection is always present in the bladder. In the vesico-vaginal fistula, incontinence of urine is the cardinal symptom.

Diagnosis: In most cases the diagnosis is not difficult. On the other hand, to find the exact location of the lesion may at times be difficult. This is especially true in the case of a uretero-vaginal fistula. Cystoscopy, cystography, excretory urography and a barium enema are aids in the diagnosis. Before any operative procedure is carried out, a study of the upper urinary system by means of an excretory pyelogram is necessary.

Treatment: Most bladder fistulae require a surgical procedure for their cure. The type of surgery depends upon the kind of fistula. For instance, a vesico-vaginal fistula can be closed either by the suprapubic or vaginal route. A vesico-enteric fistula usually requires a colostomy first; later on, after the infection has subsided, the opening between the bowel and the bladder may be closed.

Important considerations in any operative procedure for the correction of a bladder fistula are adequate exposure, complete hemostasis and the correction of any tissue tension at the site of the fistula.

SUMMARY

1. In the elderly patient the most common disease of the bladder is cystitis.

2. Cystitis should, except in specific instances, be considered a symptom and not a diagnosis.

3. Recognition of the associated pathologic processes that produce the cystitis is necessary for the proper treatment of the patient.

4. Bladder tumors, calculi, diverticula and fistulae are not uncommon. Because of improved anesthetic agents, improved surgical techniques, specific antibiotic therapy, and a better understanding of preoperative and postoperative care, elderly patients may be operated upon with a relative degree of safety.

REFERENCES

1. Wheeler, L. D.: Cystitis emphysematosa, *J. Urol.* **71:** 43–48 (Jan.) 1954.
2. Dees, J. E.: Interstitial cystitis, *J. Urol.* **69:** 496–502 (Apr.) 1953.
3. Smith, G. G.: Interstitial cystitis, *Tr. Am. A. Genito-Urin. Surgeons* **43:** 53–65, 1951.
4. Crane, J. J.: Treatment of vesical diverticula by marsupialization, *J. Urol.* **62:** 719–722 (Nov.) 1949.
5. Vermeulen, C. W.; Helsby, C. R., and Goetz, R.: Experimental urolithiasis, *J. Urol.* **68:** 790–797 (Nov.) 1952.
6. Buchert, W. I.: Treatment of vesico vaginal fistula, *J. Urol.* **69:** 665–676 (May) 1953.

THROMBOPHLEBITIC EDEMA AND HYDROCORTISONE: A CASE HISTORY

FRANCIS H. GLAZEBROOK, M.D.

New York, N. Y.*

The following case history of thrombophlebitic edema is presented because of the dramatic response obtained with hydrocortisone. Variable results have been reported in the literature on the use of cortisone and hydrocortisone in the treatment of thrombophlebitis (1–5). Although conclusions cannot be drawn from 1 case, on the basis of the improvement in this patient further trial of hydrocortisone in thrombophlebitis seems justified.

CASE HISTORY

Acute pain and swelling developed suddenly and without trauma in the foot and ankle of an elderly patient. Within forty-eight hours the pain became so intense that the patient could not rest. Examination showed thrombophlebitic edema of the foot and ankle with painful cellulitis over the internal malleolus as well as over the scar of a healed varicose ulcer. The skin on the inside of the leg was hard and pigmented. Most of the subcutaneous areolar tissue had been lost. During the previous five years, this leg and foot had been the same size as the opposite extremity, which had had no varicose involvement.

Therapy consisted of 20 mg. of Hydrocortone[1] orally every six hours in addition to an analgesic, a hypnotic, the application of an ice pack, and continuous elevation of the leg. The patient was markedly improved the day following initiation of treatment and after three doses of Hydrocortone. Pain subsided within twenty-four hours; the analgesic was discontinued after two days. The condition regressed so rapidly that the dose of Hydrocortone was reduced on the third day to 20 mg. every eight hours. In six days, the foot and ankle were nearly normal, slight puffiness appearing when the foot remained for a time in the dependent position.

Although an analgesic and other supportive therapy were used in this case, there seems little doubt that Hydrocortone had a profound and favorable effect.

REFERENCES

1. Thorn, G.: Gland chemicals for the aged, *Science News Letter* **59:** 189 (Mar. 24) 1951.
2. Irons, E. N.: Recent studies on ACTH and cortisone, *M. Clin. North America* **36:** 229 (Jan.) 1952.
3. McGraw, A. B.; Margulis, R. R., and Brush, B. E.: Twofold effect of corticotropin (ACTH) on blood clotting and its implications in surgery, *A.M.A. Arch. Surg.* **65:** 81 (July) 1952.
4. Sass, M.: ACTH and cortisone in the treatment of sickle-cell anemia: report of a case, *New England J. Med.* **246:** 583 (Apr. 10) 1952.
5. Pohl, R.: Funktionssteigerung der Nebennierenrinde durch Röntgen-Kleindosen, *Wien. klin. Wchnschr.* **65:** 211 (Mar. 13) 1953; through *Am. J. Roentgenol.* **71:** 168 (Jan.) 1954.

* Address: 111 Broadway.

[1] Hydrocortone tablets were supplied by Merck & Co., Inc., Rahway, N. J.

Abstracts of Current Literature

Albrecht, A. D.: SURGERY OF THE AGED, *Illinois M. J.* **105:** 317 (June) 1954.

Mortality rates for elective and emergency surgery in elderly individuals indicate the advisability of performing elective operations in middle aged patients, in order to avoid the slightly increased mortality rate of elective surgery in aged patients. Elective procedures should also be carried out in order to avoid conditions requiring emergency surgery at a later date. An adequate history and evaluation of an elderly patient from a clinical standpoint is often more helpful in determining his ability to withstand anesthesia and surgical trauma than a variety of laboratory tests. Preoperative restoration of water, plasma, blood, protein, electrolyte, and vitamin deficiencies, and the correction of infections with antibiotics is stressed. When there is a disturbance of cardiac rhythm and resultant circulatory insufficiency, digitalization is important in enabling the patient to tolerate the additional stress. The postoperative complications phlebothrombosis and pulmonary embolism occur more frequently in elderly individuals. Elastic support of the legs both postoperatively and prophylactically is recommended. In a group of 33 patients aged 52 to 87 years, who underwent operation, 31.4 per cent required diagnosis and treatment of diseases other than the primary one.

Berger, H.: THE TREATMENT OF POSTMYOCARDIAL INFARCTION SHOULDER-HAND SYNDROME WITH LOCAL HYDROCORTISONE, *Postgrad. Med.* **15:** 508 (June) 1954.

Eighteen patients with postcoronary occlusion shoulder-hand syndrome were treated with 50 mg. of hydrocortisone injected into trigger points about the shoulder girdle. Most of the patients required only one injection, 3 required two, and 1 patient four injections. Partial or total relief of pain occurred in twenty-four hours. Limitation of motion and trophic changes disappeared gradually. This therapy was superior to that which 14 of the patients had received previously. Four were being treated for the first time. All cases were acute and of less than three months' duration. The use of hydrocortisone similarly in causalgic states of different etiology is suggested.

Betts, J. W.: INTRA-ARTERIAL THERAPY IN OCCLUSIVE VASCULAR DISEASE, *Brit. M. J.* **1:** 1360 (June 12) 1954.

Intra-arterial injection of papaverine and tolazoline was evaluated in 40 cases of intermittent claudication and ischemic necrosis. The method is not warranted in intermittent claudication but may be a valuable adjunct to local treatment in ischemic necrosis. The dosage of papaverine was 40 mg. and of tolazoline, 100 mg., each in 20 cc. of saline, injected once weekly for six weeks into the femoral artery. No untoward reactions were noted. Most patients showed a rapid response with a local flush. In ischemic necrosis, all 5 patients showed an immediate flush to the toes and final improvement. Five of 7 receiving tolazoline showed an immediate flush to the toes and 4 experienced final improvement.

Brown, K. W. G., and Rykert, H. E.: HEPARIN IN THE TREATMENT OF ANGINA PECTORIS, *Canad. M. A. J.* **70:** 617 (June) 1954.

Under controlled conditions the effectiveness of 75 to 100 mg. of heparin intramuscularly twice weekly in reducing the frequency of pain in 20 cases of angina pectoris was no greater than that of a placebo. This result varies from that of Lyon *et al.* (1951) but in general agrees with that of other recent investigations. The psychologic benefit from a new form of treatment was striking. No delayed response was apparent, as no greater improvement occurred in the third month of treatment than in the first. Heparin had no immediate vaso-

dilator effect. Five patients suffered hematomas at the injection site. In 1 patient sensitivity to heparin was overcome with an antihistamine. No appreciable improvement was noted in 7 patients receiving 100 mg. of heparin intravenously twice weekly following the course of intramuscular injections. Two patients had an anaphylactic reaction during the third week of therapy and 1 had severe lumbar pain, pounding occipital headache, and sudden hemorrhage in the ear drum.

Chunn, C. F.: TREATMENT OF ANEURYSMS BY POLYTHENE WRAPPING, *Ann. Surg.* **139:** 751 (June) 1954.

A survey of the literature on this method is presented. Nine cases are reported in which Polythene wrapping was used for aneurysms of the thoracic aorta (2 cases), the abdominal aorta (5 cases), the common carotid artery (1 case), and the subclavian artery (1 case). The ages of the patients ranged from 49 to 66. The aneurysm was arteriosclerotic in 8 cases and syphilitic in one. In the first 5 cases, 1.5 mil reactive Polythene wrapping was used. In the remainder, the inner surface of the Polythene was coated with a solution of diacetyl phosphate in toluene. The complete relief obtained in 5 cases has continued for periods of one to three and a half years. In 2 patients without preoperative symptoms, no symptoms have occurred postoperatively for a year in one, and for two years and four months in the other. Two patients who were poor risks died within forty-eight hours. A third patient died two years following operation from an unrelated cause. This method warrants wider use. If employed promptly after early detection of an aneurysm, improved results should be evident.

DeBakey, M. E., and Cooley, D. A.: SURGICAL CONSIDERATIONS OF ACQUIRED DISEASES OF THE AORTA, *Ann. Surg.* **139:** 763 (June) 1954.

Aneurysms and thrombo-obliterative disease comprise the most common and serious forms of aortic lesions for which treatment has been generally unsatisfactory. Recently efforts have been directed toward a more effective form of therapy, consisting of extirpation of the lesion and restoration of function, either by aortic repair or by use of aortic homografts. For aneurysms of the aorta, two types of procedure may be employed, depending primarily upon the nature and location of the lesion. Tangential excision with lateral aortorrhaphy is applicable to sacciform aneurysms, arising usually about the aortic arch. Resection, with replacement by aortic homografts, is usually necessary in fusiform aneurysms of the descending thoracic and abdominal aorta. Thrombo-obliterative disease of the aorta is encountered most frequently about the bifurcation, but occasionally occurs in the descending thoracic aorta. Resection, with replacement by aortic homografts, is considered an effective form of therapy. (Excerpt of authors' summary.)

Goldbloom, A. A.; Eiber, H. B., and Boyd, L. J.: CLINICAL STUDIES IN BLOOD LIPID METABOLISM. IX. EFFECT OF LIPOTROPIC AGENTS ON SERUM LIPID PARTITIONS IN FIFTY PATIENTS WITH GENERALIZED ATHEROSCLEROSIS: A THREE YEAR STUDY, *Am. J. Digest. Dis.* **21:** 152 (June) 1954.

Fifty patients with clinical generalized atherosclerosis and chronic coronary artery disease were maintained on a low-fat, low-cholesterol diet for thirty-six months. Twenty-five of these patients were given therapeutic dosages of a lipotropic preparation during this period. Serum lipid fractions, such as cholesterol, phospholipids, total lipids and neutral fats, were determined and averaged on all 50 patients at the onset of the study and at six-month intervals for a period of three years. Except for a slight decrease in the level of serum cholesterol in all the 50 patients, attributable to the low-fat dietary restrictions, there were no significant differences between the other serum lipid fractions. Changes in the ratio

of phospholipid to cholesterol were practically the same in the control and in the lipotropic groups of patients. A low-fat, low-cholesterol diet has the same effect as lipotropic agents upon reducing serum lipid partitions. There is no clinical or laboratory confirmation of the value of known lipotropic preparations in the treatment or prophylaxis of human atherosclerosis. (Authors' summary.)

Goldner, M. G.; Brown, R. A.; Cohen, C.; Cox, H.; Lasser, R. P., and Loewe, L.: SERUM LIPOPROTEIN PATTERNS IN A GROUP OF ELDERLY DIABETICS, *Am. J. M. Sc.* **227:** 618 (June) 1954.

Serum lipoprotein determinations were made in 41 elderly diabetics with a variety of clinical syndromes. Patients with peripheral vascular disease showed higher levels of all classes of lipoproteins than were found in patients with cerebrovascular disease alone, or in those without peripheral vascular, cardiovascular or cerebrovascular disease. This relationship was shown to be statistically significant in the Class S_f 35–100. The differences could not be accounted for by differences in age, sex, duration or severity of diabetes, or presence of renal disease or hypertension. Determinations were made on blood samples obtained after overnight fasting, it previously having been shown that the ingestion of cream altered the blood levels of all classes of lipoproteins.

Greenspan, E. M.: SURVEY OF CLINICAL SIGNIFICANCE OF SERUM MUCOPROTEIN LEVEL, *A. M. A. Arch. Int. Med.* **93:** 863 (June) 1954.

The serum concentration of mucoprotein in adult females normally varies from 40 to 70 mg. per 100 ml., and in adult males from 48 to 75 mg. per 100 ml. Mucoprotein determinations in 1,533 patients were surveyed in order to determine the effects of disease on these levels. Those diseases characterized by inflammatory, neoplastic, degenerative, thrombotic, or traumatic tissue changes were associated with a significant incidence of increased serum mucoprotein levels. Reduced levels were found in 70 to 90 per cent of patients with infectious hepatitis, homologous serum hepatitis, portal cirrhosis, panhypopituitarism and Addison's disease. The sera of more than half of the patients with nephrosis and myeloma showed low concentrations. Approximately one fourth of patients with thyroid disorders and one sixth of patients with diabetes mellitus had low levels. Approximately half of all patients with low values had portal cirrhosis, infectious hepatitis, or homologous serum hepatitis, and one fourth had endocrine disease. The potential value of these determinations as an aid to differential diagnosis is discussed. The hypothesis is presented that the serum mucoprotein level may represent a resultant or an equilibrium between two sets of factors: 1) hepatic and endocrine functions which, when impaired, lower the level, and 2) tissue proliferative and degenerative processes which, when accelerated (as in inflammatory, neoplastic or traumatic disease), result in increased mucoprotein levels.

Jawetz, E.: EFFECT OF CORTISONE ON THERAPEUTIC EFFICACY OF ANTIBIOTICS IN EXPERIMENTAL INFECTIONS, *A. M. A. Arch. Int. Med.* **93:** 850 (June) 1954.

In subacute bacterial infections in mice, small amounts of cortisone interfered with the therapeutic effectiveness of antibiotics, both when given prior to treatment and when given along with the antibiotic, preceding the infection. The magnitude of the effect depended upon the severity of the infection and the dose of antimicrobial drug. It was greatest when the result of treatment with the latter was subcurative. With an excess of antibiotic over the curative dose, the effect was no longer apparent. It was shown to be mediated through the host defense mechanisms but the precise mechanism was not determined. From a practical standpoint, the nature of the depression of the host defense mechanisms by cortisone may be of little importance. However, cortisone may be contraindicated in infections caused by antibiotic-resistant micro-organisms, in which these agents cannot

be expected to eradicate the bacteria promptly. These experiments suggest that large doses should be used when antibiotics are employed to "cover" the infection-enhancing properties of cortisone.

Källqvist, I.: ARTIFICIAL PNEUMOTHORAX IN MIDDLE-AGED AND ELDERLY PATIENTS, *Am. Rev. Tuberc.* **69:** 968 (June) 1954.

Sixty-one artificial pneumothoraces were induced in 58 elderly tuberculous patients, and are being maintained in 9. In 22 cases of elective discontinuance, refills were given for at least three years. One patient died of nontuberculous disease and 8 of progressive tuberculosis. Of 13 survivors, 10 showed healed lesions on x-ray examination and sputum "conversion." Among 30 cases of prematurely abandoned pneumothorax (because of inadequacy of pleural space, serous effusion, empyema), 17 deaths occurred—pulmonary embolism 2, nontuberculous causes 3, progressive tuberculosis 12. Of the 13 survivors, 7 had undergone thoracoplasty or pulmonary resection. Only 2 of the remaining 6 showed pulmonary healing and negative bacillary findings. Frequency of serous effusion did not decrease in 17 patients given antimicrobial agents prior to pneumothorax but the incidence of empyema fell to zero. Antimicrobial agents have widened the indications for artificial pneumothorax in older age groups, but thoracoplasty or pulmonary resection may be preferable in some cases. If complications that might damage respiratory function are watched for, a trial of artificial pneumothorax is justified in middle aged and elderly patients in whom the site and extent of the tuberculous lesions promise good selective collapse of the lung.

Kirby, C. K.: EDITORIAL: AORTIC ANEURYSMS, *Pennsylvania M. J.* **57:** 542 (June) 1954.

Recent advances in surgery improve the outlook for patients with aneurysm of the aorta. Excision of a saccular aneurysm with suture of the aneurysmal neck is of greatest value in the region of the aortic arch, where resection together with the involved aortic segment and restoration by an aorta homograft is not as yet feasible. Saccular aneurysms of the descending thoracic and upper abdominal aorta may also be excised and the neck sutured. An aneurysm distal to the aortic arch may be resected and the aorta segment replaced by a graft. This method has been used successfully for arteriosclerotic aneurysms of the terminal aorta, including the bifurcation, where the aorta may be occluded for long periods without danger of paraplegia. Above the renal arteries, a glass tube within the graft is used to bridge the defect during suturing. It is removed and the aorta occluded only for suturing of the last third of the second line. These operations relieve symptoms and may prolong lives but the serious generalized vascular disease of the patients must be borne in mind.

Kissane, R. W.; Fidler, R. S., and Conn, J. J.: THE INCIDENCE OF THE THROMBOEMBOLIC PHENOMENA ASSOCIATED WITH THE TREATMENT OF ACUTE CORONARY ARTERY OCCLUSION, *Am. J. M. Sc.* **227:** 663 (June) 1954.

There is a lower incidence of mural thrombi in persons with acute coronary artery occlusion who have received anticoagulants. The lowest death rate and lowest incidence of thromboembolic complication were in the group of patients who had received erythrityl tetranitrate. The routine or mandatory use of an anticoagulant in every case of acute coronary artery occlusion is not advocated. Further investigation is required to determine the clinical indications for the use of anticoagulants. A re-evaluation of the treatment of acute coronary artery occlusion is indicated, especially in regard to the role of the efficient vasodilator drugs, such as erythrityl tetranitrate, in lowering the mortality and preventing thromboembolic complications. This is necessary in order to establish a more accurate knowledge of the true incidence and cause of these thromboembolic phenomena. (Authors' conclusions.)

Kohn, G.: THE VAGINAL SMEAR AS A PROGNOSTIC AID IN CARCINOMA OF THE CERVIX TREATED ACCORDING TO THE INDIVIDUALIZED STOCKHOLM METHOD, *Acta radiol.* **41:** 446 (May) 1954.

The prognosis for patients suffering from carcinoma of the cervix is made (after the technic described by Graham) during the course of radiation therapy, on the basis of the radiation changes observed in the benign cells in the vaginal smears. A series of 50 patients followed from one to one and a half years is presented. Of 32 patients having a "good" response, 27 are well and symptom-free and 5 have a recurrence. Of 18 patients having a "poor" response, 16 have persistent disease, a recurrence, a pelvic metastasis or have died of their disease; 1 has had a fulguration on the basis of a positive vaginal smear, and 1 patient is well and symptom-free. The method seems to be of great value in assessing individual treatment of the patient. (Author's summary.)

Lisa, J. R., and Gioia, J. D.: SURFACE SPREAD OF CARCINOMA: REPORT OF TWO CASES IN RENAL PELVIC TUMORS, *J. Urol.* **71:** 682 (June) 1954.

The noninvasive spread of carcinoma along an epithelial surface may be extensive and easily overlooked, as macroscopic changes usually are minimal. Microscopically the lesions at the papillary tip in these 2 cases were papillomatous and the epithelial cells were neoplastic and nonkeratinizing-squamous in nature. The spread of the tumor over the mucosal surface of the pelvis was confined by the basement membrane and remained noninvasive. In one patient, it had spread down the ureter to the point of resection. Parenchymal involvement was similar in nature to that in the pelvis. The tubular epithelium was replaced by tumor cells extending upward from the papillae, with penetration to the capsule in one instance and involvement of most parts of the organ.

Lochhead, R. P.; Coakley, C. S., and Evans, J. M.: THE RISK OF MAJOR SURGERY IN PATIENTS WITH CORONARY ARTERY DISEASE, *Am. J. M. Sc.* **227:** 624 (June) 1954.

A review of morbidity and mortality observations in patients with coronary artery disease undergoing major operative procedures shows that these patients do not pose as forbidding a surgical problem as was once thought. In 17 patients with myocardial infarction undergoing 30 operations, there were 3 deaths and 1 postoperative complication. In 15 patients with angina pectoris undergoing 21 operations, there were no deaths and 2 postoperative complications. There were no operative complications in either group. These figures compare favorably with others recently reported.

Löffler, W.; Essellier, A. F., and Forster, G.: ACETYL-DIGITOXIN. CLINICAL OBSERVATIONS ON THE TREATMENT OF PATIENTS WITH ADVANCED CONGESTIVE HEART FAILURE, *Am. Heart J.* **47:** 898 (June) 1954.

Acetyl-digitoxin is a glycoside obtained from *Digitalis lanata*, which is well absorbed from the alimentary tract, acts relatively quickly, greatly reduces the heart rate, and has a pronounced diuretic effect. It is well tolerated and has a wide therapeutic margin. Because of these properties this glycoside, given orally or parenterally, has proved valuable, especially in cases of cardiac failure with tachycardia, such as auricular fibrillation with high ventricular rate, auricular flutter and paroxysmal tachycardia. Because of its high rate of fixation, more persistent action, and cumulation, it is well suited for the maintenance treatment of patients with chronic cardiac failure. As its effect is more quickly reversible than that of digitoxin, treatment with acetyl-digitoxin can be more easily controlled. Signs of intoxication occurring as a result of overdosage disappear within one to three days after

discontinuing treatment. They correspond to those produced by other digitalis glycosides. Signs of local irritation due to the alcohol content of the solution, which may occur during intravenous injection, can be avoided by diluting one part of the ampul solution with three parts of glucose or aminophylline. (Authors' summary.)

Miller, M. W., and Pendergrass, E. P.: SOME OBSERVATIONS CONCERNED WITH CARCINOMA OF THE BREAST. Part V, *Pennsylvania M. J.* **57:** 421 (May) 1954.

The significance of delay in relation to survival-time was analyzed in 1,029 patients aged 30 to 70 with carcinoma of the breast, between the years 1923 and 1943. Only 7 per cent reported for treatment within two weeks after the onset of symptoms, and 46 per cent within six months. Ninety-three per cent discovered the lesion themselves. The cause for delay in 489 was personal negligence and in 174, temporizing advice from a physician. Treatment commenced within two weeks after diagnosis in 767, and after more than two weeks in 150. In 112, the interval was unknown. Five-year survival rates in the various groups were as follows: reporting in two weeks, 57 per cent; reporting after a year or more, 29 per cent; tumor of 22 mm. or less, 55.5 per cent; tumor of 90 mm. or over, 8.6 per cent; tumor localized to breast, 70.3 per cent; tumor with axillary metastases, 20.8 per cent. There was no significant difference in survival rates by age groups.

Pisciotta, A. V.; Hinz, J. E., and Hirschboeck, J. S.: EFFECT OF GANTRISIN ON THE PROTHROMBIN TIME, *J. Urol.* **71:** 768 (June) 1954.

A controlled study of 8 elderly and chronically ill patients failed to show any effect of Gantrisin (4 Gm. daily for at least three weeks) on prothrombin times. Five patients who received Gantrisin (in doses of 2 to 4 Gm. daily) for from twenty-eight to fifty-three days for the treatment of urinary tract infections had normal prothrombin levels at the end of Gantrisin therapy. (Authors' summary.)

Relman, A. S.; Leaf, A., and Schwartz, W. B.: ORAL ADMINISTRATION OF A POTENT CARBONIC ANHYDRASE INHIBITOR ("DIAMOX"). II. ITS USE AS A DIURETIC IN PATIENTS WITH SEVERE CONGESTIVE HEART FAILURE, *New England J. Med.* **250:** 800 (May 13) 1954.

Diamox administered to 26 patients for twenty-eight days was of little value. Half of the group failed to lose weight. Twelve lost only 2 to 6 pounds in seven days. One patient lost 11 pounds in nine days and became edema-free. Administration once daily was as effective as more frequent dosage. Diamox did not prevent the development of mild acidosis, or resistance to further therapy. Many of the patients, who responded poorly or not at all, lost weight when given mercurial diuretics combined with aminophylline and ammonium chloride.

Riven, S. S., and Pocock, D. G.: CURRENT CONCEPTS OF HYPERTENSION, *Am. Pract. & Digest Treat.* **5:** 325 (May) 1954.

Chronic diastolic hypertension is due to increased peripheral resistance caused, among other things, by nervous and humoral mechanisms. It becomes a problem clinically when it leads to hypertensive cardiovascular disease. Treatment involves evaluation of the severity of the disease, determination of the rate of progression, and selection of a means of lowering peripheral resistance. Treatment methods include drug therapy, sympathectomy, diet and psychotherapy. Among central depressors are sedatives, *Veratrum*, Apresoline, and *Rauwolfia*. Sedatives are too low in activity to be useful alone. Veratrum alkaloids lower peripheral resistance but because of their narrow therapeutic index, clinical control without side-actions is difficult. Apresoline is of relatively low toxicity and moderate potency; it is

usually combined with some other agent. *Rauwolfia serpentina*, which has not been adequately evaluated, has a complex sedative and depressor action. Hexamethonium is the only peripheral blocking agent of practical value. It dramatically lowers blood pressure, but may lower it too far. Initially it is a sympathetic blocking agent, but as resistance to it develops, stimulation of sympathetic ganglia may occur. Humoral antagonists are not particularly successful. Direct vasodilators are used only in acute hypertensive crises.

Roberts, E.: A NEW APPROACH TO NIGHTTIME SEDATION, *Am. J. M. Sc.* **227:** 609 (June) 1954.

Nineteen of 21 patients with sleep disturbances, who had not responded satisfactorily to heavy doses of various barbiturates, were benefited by a sustained-release preparation of phenobarbital. They obtained longer, more refreshing sleep, free from hangover. Better results were obtained with lower doses of this medication than with large doses of more potent drugs. Administration forty-five minutes prior to retiring dissociated the taking of medication from the idea of induction of sleep thus reducing the patient's anxiety and fear of sleeplessness. The slow release of the drug resulted in more natural sleep with less possibility of oversedation.

Roberts, P. A. L.: A DANGER OF PEPTIC ULCERATION. A SURVEY OF EIGHT CASES COMPLICATING SURGERY AND TRAUMA, *Brit. M. J.* **1:** 1295 (June 5) 1954.

Four of 8 patients died as a result of ulceration arising as a complication of surgery or trauma in patients over the age of 50. The time-interval between the original trauma and the first symptoms varied from four days to ten weeks. Such ulceration may occur for the first time or be an exacerbation of previous ulceration. Careful postoperative watch should be maintained for epigastric postprandial pain, melena, and coffee-ground vomit; blood transfusion should be instituted if necessary. Vigorous medical management may avert death in this complication, which has a high mortality rate.

Rosenblum, J. M., and Hendricks, C. H.: ESTROGENATED VAGINAL EPITHELIUM. RELATIONSHIP TO THE DEVELOPMENT OF CARCINOMA OF THE ENDOMETRIUM, *Obst. & Gynec.* **3:** 535 (May) 1954.

Vaginal smears in 8 premenopausal women (average age 44.7 years) with adenocarcinoma of the endometrium showed estrogen activity even after surgical or roentgen castration. In 38 cases of corpus carcinoma in postmenopausal women (average age 62.8 years) there was evidence of estrogen activity after castration in 29 (74 per cent). Two (5 per cent) showed no estrogen activity prior to therapy. Sixty per cent of a control series of 30 women (average age 60.8 years) who experienced a natural menopause showed evidence of estrogen activity. The difference between this and the group with corpus carcinoma was not statistically significant. All vaginal smears of a control group of 14 surgical castrates (average age 49.5 years) showed estrogen activity when studied 3.5 years following castration. In patients in whom endometrial carcinoma developed postmenopausally the menopause occurred 5.6 years later than in patients who had a natural menopause.

Snapper, I.; Bradley, W. G., and Wilson, V. E.: METASTATIC CALCIFICATION AND NEPHROCALCINOSIS FROM MEDICAL TREATMENT OF PEPTIC ULCER, *A. M. A. Arch. Int. Med.* **93:** 807 (June) 1954.

Two additional cases of metastatic calcification with dietary etiology are presented. The first agrees well with the 7 recently published cases. The second is rather unique in that the

calcium intake was below recommended daily requirements, leaving the alkaline-ash diet and excess alkali ingestion as the only observable dietary deviations. Thus it would appear that an excess of alkalinizing agents is the more important factor in the growing series of cases of pathologic calcification due to diet. (Authors' summary.)

Spence, A. W.: THE MALE CLIMACTERIC: IS IT AN ENTITY? *Brit. M. J.* **1:** 1353 (June 12) 1954.

The male climacteric is a definite clinical entity for the following reasons: Similar symptoms occasionally occur in postpubertal castrates and eunuchoids, and are improved by androgen therapy. The 17-ketosteroid secretion, although by no means diagnostic of testicular insufficiency, tends to be low. Some of the symptoms may be explained by lack of the anabolic action of testosterone. The urinary excretion of gonadotropin is raised—indicative of testicular, but not necessarily of androgen, insufficiency. Histologically, the testis may show structural changes. The symptoms are improved with androgen therapy, but recur when an inert substance is substituted. Arguments similar to those advanced against the concept of a male climacteric could be raised against the existence of a female climacteric, which, however, has never been questioned. (Author's summary.)

Stein, I. D., and Rose, O. A.: TREATMENT OF SUPERFICIAL THROMBOPHLEBITIS WITH PHENYLBUTAZONE (BUTAZOLIDIN), *A.M.A. Arch. Int. Med.* **93:** 899 (June) 1954.

Thirty-three patients with superficial thrombophlebitis due to various causes, many of whom had not responded to other therapy, were treated with 200 mg. of phenylbutazone three times daily for three days, and then 200 mg. twice daily. The drug was used for one week in most cases and all other therapy abandoned. Twenty-nine patients, including 2 with thromboangiitis obliterans, had rapid and complete resolution of the venous inflammation and 4 had partial resolution. In 3 patients showing a tendency toward recurrence, large doses were used as suppressive treatment and discontinued after total doses of 7 to 15 Gm. had been given. No further recurrence was noted. With the combined analgesic and anti-inflammatory actions of phenylbutazone, pain, swelling, much of the induration, and all of the redness of the superficial veins disappeared in twenty-four hours in a few instances and in seventy-two to ninety-six hours in most cases. No allergic reactions were observed. Renal colic in one patient may have been due to the drug. The mode of action of phenylbutazone is not known.

Storch, S., and Tang, Z. T.: CARDIAC ARRHYTHMIAS IN THE AGED, *Am. Pract. & Digest Treat.* **5:** 367 (May) 1954.

The frequency and significance of arrhythmias in the aged is stressed. Lanatoside C intravenously is most effective in auricular tachycardias, but Mecholyl, carotid sinus stimulation, and Neosynephrine have no place in their treatment. Procaine amide should be tried before quinidine in ventricular arrhythmias. Age does not contraindicate the latter, when indicated, as in paroxysmal auricular fibrillation or flutter. Digitalization with Digoxin is preferred and maintenance, when successful, with Digoxin or Digilanid. The possibility of co-existing rheumatic, syphilitic, thyrotoxic, or congenital heart disease is considered in arrhythmias in the aged. Wolff-Parkinson-White type electrocardiograms may be associated with a higher incidence of paroxysmal tachycardias. Strophanthin may be given to patients with cardiac arrhythmias and heart failure. Oxygen is a valuable adjunct. Complete atrioventricular dissociation is often well supported by aged patients and may need no specific treatment. (Excerpt of authors' summary and conclusions.)

Vogl, A.: THE MERCURIAL DIURETICS, *Am. Pract. & Digest Treat.* **5:** 356 (May) 1954.

A review of recent studies yields suggestions applicable to the use of diuretics. Low-sodium syndrome and hypochloremic alkalosis may result from excessive diuresis, particularly in elderly individuals, because of impaired renal function. Interruption of the diuretic, and replacement therapy are indicated. Response to a mercurial diuretic should be determined before prescribing a second dose, in order to avoid mercurialism and serious sequelae of excessive diuresis. The disadvantages of intermittent injections may be overcome by timing each on the basis of daily weight records and using small doses every two or three days. Parenteral administration is preferable, because uninterrupted mercurialization of kidney tubular cells, as with oral medication, may not be an innocuous procedure. Hypersensitivity to mercurials is usually acquired. An immediate reaction to an intravenous injection contraindicates re-use of a compound. Changing the route of administration does not avoid reactions. Once a mild allergic reaction has occurred, reactions to subsequent intramuscular injections are likely to be increasingly severe. Mercury fastness may be overcome by combining mercurials with diuretics of other types such as ammonium chloride, sodium dehydrocholate, or carbonic anhydrase inhibitors. If diuresis must be intensified and prolonged, aminophylline or related xanthine compounds may be used in the combination.

Zelman, S.: MASSIVE DIURESIS IN CONGESTIVE HEART FAILURE, *J. Kansas M. Soc.* **55:** 317 (June) 1954.

Massive diuresis following therapy of congestive heart failure is reported in 2 patients, in 1 of whom the low-salt syndrome developed. This difference is explained by the knowledge that mercurial diuresis brings about an excretion primarily of chloride ions, secondarily of sodium ions, and incidentally an associated water diuresis, whereas diuresis due to digitalization of a failing heart is primarily an effect of mobilization of excess fluid. Thus the diuresis of the first patient, who lost 67 pounds in ten days, appears to have been a reflection of the effect of initial digitalization, whereas that of the second patient followed more closely the pattern of mercurial diuresis and salt restriction.

In keeping with the objectives of the Society to make readily available to the medical profession knowledge of the latest clinical practices having to do with this broad field

THE AMERICAN GERIATRICS SOCIETY

will give a

GRADUATE SYMPOSIUM on GERIATRIC MEDICINE

at the Roosevelt Hotel, New York City, November 12 and 13, 1954.

This is a service provided by the Society for its Fellows and all members of the medical profession.

Distinguished specialists from our leading medical schools and teaching hospitals will conduct the symposium.

We cordially invite all interested physicians to attend this important symposium.

There will be no registration fee.

The Roosevelt Hotel in New York has set aside a number of rooms to take care of physicians attending this symposium. Those who plan to attend should write to Mr. A. G. Schellenberg, Reservation Manager, Hotel Roosevelt, Madison Avenue at 45th Street, New York 17, New York. Mention that you will attend the symposium and Mr. Schellenberg will be glad to take care of your needs.

The American Geriatrics Society

PROGRAM

GRADUATE SYMPOSIUM ON GERIATRIC MEDICINE

November 12 and 13, 1954

Friday, November 12—9:00 a.m. to 1:00 p.m.

Edward Henderson, M.D., presiding

9:00– 9:20

1. GERIATRICS—A DEFINITION
   Marvin Weinberg, M.D., New York, N. Y.

9:20– 9:40

2. LOW DOSAGE ANDROGEN-ESTROGEN THERAPY IN THE MALE AND FEMALE OLDER AGE GROUP
   Charles H. Birnberg, M.D., Attending Physician, Obstetrics, Female Sex Endocrinology, and Female Endocrine Research, Jewish Hospital, Brooklyn, New York.

9:40–10:00

3. Male Climacterium

Thomas H. McGavack, M.D., Professor of Clinical Medicine, New York Medical College, Flower and Fifth Avenue Hospitals, New York, N. Y.

10:00–10:15

Discussion

10:15–10:30

Recess for refreshments

10:30–11:00

4. Recent Progress in Cancer Therapy

Cornelius P. Rhoads, M.D., Professor of Pathology, Sloan-Kettering Division of Cornell University Medical College; Director, Sloan-Kettering Institute for Cancer Research; and Scientific Director, Memorial Center for Cancer and Allied Diseases, New York, N. Y.

11:00–11:30

5. Project and Technique Rationale of Sex Steroid Replacement in the Neuter Gender

William H. Masters, M.D., Associate Professor of Obstetrics and Gynecology, Washington University, St. Louis, Missouri.

11:30–12:00

6. Prostatic Obstruction in the Aged

Robert S. Hotchkiss, M.D., Professor and Chairman, Department of Urology, New York University-Bellevue Medical Center, New York, N. Y.

12:00– 1:00

7. Surgical Alleviation of Parkinsonism: Effects of Occlusion of the Anterior Choroidal Artery

Irving S. Cooper, M.D., Associate Professor of Neurosurgery, New York University-Bellevue Medical Center, New York, N. Y.

Friday, November 12—2:00 p.m. to 5:45 p.m.

Thomas H. McGavack, M.D., presiding

2:00– 2:30

8. The Endocrine Glands and Their Ability to Stabilize Body Function Under Stress Conditions

William B. Kountz, M.D., Assistant Professor of Clinical Medicine, Washington University School of Medicine, St. Louis, Missouri.

2:30– 3:00

9. Emergency and Prophylactic Corticoid Therapy in Individuals Past Fifty

Laurance W. Kinsell, M.D., Director, Institute for Metabolic Research, Highland Alameda County Hospital, Oakland, California.

3:00– 3:30

10. Nutrition and Aging

Fredrick J. Stare, M.D., Professor of Nutrition, and Chairman, Department of Nutrition, Harvard University, School of Public Health, Boston, Massachusetts.

3:30– 3:45

Recess for refreshments

3:45– 4:15

11. RECENT ADVANCES IN THE TREATMENT OF SENILE VAGINITIS, KRAUROSIS, AND LEUKOPLAKIA

Charles Lee Buxton, M.D., Professor of Obstetrics and Gynecology, and Chairman, Department of Obstetrics and Gynecology, Yale University School of Medicine, New Haven, Connecticut.

4:15– 4:45

12. OBESITY AND DIABETES: TWO RELATED PROBLEMS OF LATER LIFE

C. N. H. Long, M.D., Professor of Physiology, and Chairman, Department of Physiology, Yale University School of Medicine, New Haven, Connecticut.

4:45– 5:15

13. THE PREPARATION OF THE GERIATRIC PATIENT FOR SURGERY OF THE BILIARY TRACT

Frank Glenn, M.D. and Richard Karl, M.D.***

* Professor of Surgery, ** Instructor in Surgery, Cornell University Medical College; * Surgeon-in-Chief, ** Assistant Attending Surgeon, New York Hospital, New York, N. Y.

5:15– 5:45

14. RESPIRATORY ALLERGY AND ITS MODIFICATIONS IN PATIENTS OVER FORTY-FIVE YEARS OF AGE

Fred W. Wittich, M.D., Managing Editor, *Annals of Allergy*, and Secretary-Treasurer, The American College of Allergists, Minneapolis, Minnesota.

Saturday, November 13—9:00 a.m. to 12:45 p.m.

Laurance W. Kinsell, M.D., presiding

9:00– 9:30

15. OVARIAN FUNCTION IN MENOPAUSAL AND POSTMENOPAUSAL WOMEN

C. Alvin Paulsen, M.D., William O. Maddock, M.D.† and Robert B. Leach, M.D.‡*

* U. S. Public Health Service Fellow in Medicine, † Assistant Professor of Medicine, ‡ Instructor in Medicine, Wayne University College of Medicine, Detroit, Michigan.

9:30–10:00

16. GYNECOLOGIC CANCER IN THE OLDER PATIENT

John McLean Morris, M.D., Associate Professor of Gynecology, Yale University School of Medicine, New Haven, Connecticut.

10:00–10:30

17. CLINICAL STUDIES IN PROSTATIC CANCER

William Wallace Scott, M.D., Professor of Urology, Johns Hopkins University School of Medicine, Baltimore, Maryland.

10:30–10:45

Recess for refreshments

10:45–11:15

18. CORTISONE IN THE TREATMENT OF ADVANCED CANCER
Carlos P. Lamar, M.D., Director, Department of Endocrinology, Jackson Memorial Hospital of the Medical School, University of Miami, Miami, Florida.

11:15–11:45

19. THE INFLUENCE OF EMOTIONAL ATTITUDES ON THE AGING PROCESS
David C. Wilson, M.D., Professor of Neurology and Psychiatry, and Chairman, Department of Neurology and Psychiatry, University of Virginia School of Medicine, Charlottesville, Virginia.

11:45–12:15

20. PROBLEMS OF CHEMOTHERAPY IN THE OLDER AGE GROUP
David Lehr, M.D., Professor of Pharmacology and Associate Professor of Medicine, New York Medical College, Flower and Fifth Avenue Hospitals, New York, N. Y.

12:15–12:45

21. ELEVATED TITERS OF STEROIDS IN OBESE MEN AND THE POSSIBILITY THAT STEROIDS PROMOTE SOME OF THE ADVERSE EFFECTS ASSOCIATED WITH OBESITY
James B. Hamilton, M.D., Professor of Anatomy, State University of New York, College of Medicine, Brooklyn, New York.

Saturday, November 13—2:00 p.m. to 6:00 p.m.

Malford W. Thewlis, M.D., presiding

2:00– 2:30

22. THE ADVANTAGES OF THE USE OF UNRESTRICTED DIET IN THE TREATMENT OF PEPTIC ULCER IN THE AGED
Edward A. Marshall, M.D., Chief, Department of Medicine, Huron Road Hospital, East Cleveland, Ohio.

2:30– 3:00

23. THE PROS AND CONS OF ESTROGEN ADMINISTRATION AFTER THE MENOPAUSE
E. Kost Shelton, M.D., Clinical Professor of Medicine, University of California at Los Angeles, Los Angeles, California.

3:00– 3:30

24. CORTISONE IN THE IMMEDIATE THERAPY OF APOPLECTIC STROKE
Henry I. Russek, M.D., Consultant in Cardiovascular Research, U.S.P.H.S., Associate Cardiologist, Seaview Hospital, and Attending Cardiologist, Staten Island Hospital, OPD, Staten Island, New York.

3:30– 3:45

Recess for resfreshments.

3:45– 4:05

25. THE RELATIONSHIP OF BLOOD LIPIDS TO CORONARY HEART DISEASE
Menard M. Gertler, M.D., Special Research Fellow, National Heart Institute, Department of Biochemistry, New York University-Bellevue Medical Center, New York, N. Y.

4:05– 4:25

26. The Effects of Sitosterol and Lipotropes on the Blood Lipids and the Clinical Course of Angina Pectoris

Charles F. Wilkinson, Jr., M.D., Professor of Medicine, and Chairman, Department of Medicine, New York University Medical School, New York, N. Y.

4:25– 4:45

27. Recent Developments in the Treatment of Hypertension

Edward D. Freis, M.D., Chief of Medicine, Veterans Administration Hospital; Chief, Cardiovascular Research Laboratory, Georgetown University Hospital; and Adjunct Clinical Professor of Medicine, Georgetown University School of Medicine, Washington, D. C.

4:45– 5:05

28. Heart Disease and Obesity

Arthur M. Master, M.D. and Harry L. Jaffe, M.D.***

* Associate Clinical Professor of Medicine, ** Lecturer, Columbia University, College of Physicians and Surgeons; * Cardiologist, ** Attending Physician, Mount Sinai Hospital, New York, N. Y.

Edward Henderson, M.D., presiding

5:05– 6:00

Panel Discussion on Heart Disease

Doctors Freis, Gertler, Lehr, Master, Russek, and Wilkinson.

1955 ANNUAL MEETING

AMERICAN GERIATRICS SOCIETY

Hotel Roosevelt, New York City
April 21 and 22, 1955

ALL FELLOWS ARE URGED TO ATTEND THE ANNUAL MEETING.

MAKE PLANS EARLY.

The Hotel Roosevelt in New York has set aside a number of rooms to take care of Fellows who plan to attend the meeting. Write to Mr. A. G. Schellenberg, Reservation Manager, Hotel Roosevelt, Madison Avenue at 45th Street, New York 17, New York. Mention that you will attend the annual meeting and Mr. Schellenberg will be glad to take care of your needs.